The Role of Producer Organisations: The Economic Impact of Membership on Smallholder Tea Farmers in Myanmar

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Abstract

Myanmar, despite its ideal climate conditions for tea cultivation and its being one of the major tea producers, smallholder tea farmers in the country face numerous challenges, including limited access to value-addition techniques, market information, affordable credit, and adequate infrastructure. Numerous studies suggest that producer organisations can address these issues by providing technical training, facilitating market access, and enabling collective bargaining, among other benefits. However, there is a significant research gap in understanding the economic impact of these organisations on Myanmar's tea industry. This study addresses this gap by exploring how producer organisations influence farmers' decisions to join and how membership subsequently affects their profitability.

The study adopts a quantitative research approach using survey data collection methods. Before the survey, pre-interviews were conducted to gather insights and develop a comprehensive and relevant survey questionnaire. A survey was conducted with 400 smallholder tea farmers, comprising 239 members and 161 non-members of producer organisations. Econometric techniques, including probit regression and propensity score matching (PSM), were used to analyse the data. The probit regression model identified significant factors influencing the decision to join producer organisations, such as certification, access to market information, extension services, and education level. Specifically, certification increased the likelihood of joining by 89%, access to market information by 24%, extension services by 43% and education by 5.33%.

In addition, the impact of membership on profit per acre was assessed using PSM, which revealed that membership significantly enhances profitability. The Nearest Neighbour Matching (NNM) and Radius Matching (RM) methods showed that membership results in significant average profit increases of 698,094 MMK and 640,183 MMK per acre, respectively. These results indicate that membership in producer organisations significantly enhances the profitability of smallholder tea farmers.

The study suggests that encouraging wider participation in producer organisations is essential for enhancing the economic outcomes of more farmers. Producer organisations should strengthen their efforts, particularly in remote and less accessible areas, to inform farmers of membership benefits. Furthermore, governments and NGOs should actively support the development of producer organisations. Strengthening producer organisations' roles in facilitating certification, improving market linkages, and supporting sustainable farming practices will contribute to Myanmar's tea industry's long-term growth and sustainability.

Keywords: Producer organisation, smallholder farmers, tea, probit regression, propensity scores matching, membership, economic outcomes, certification, Myanmar

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Table of Content

List of Tables

List of Figures

Abbreviations

ADB	Asia Development Bank
ATT	Average Treatment Effect on the Treated
FAO	Food and Agriculture Organisation
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FPOs	Farmer Producer Organisations
GDP	Gross Domestic Products
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ILO	International Labour Organisation
MFVP	Myanmar Fruit Flower Vegetable Producer and Exporters Association (MFVP)
MIMU	Myanmar Information Management Unit
MTA	Myanmar Tea Association
NGOs	Non-Government Organisations
NNM	Nearest Neighbour Matching
PGs	Producer Groups
POs	Producer Organisations
PSM	Propensity Score Matching
RM	Radius Matching
USDA	U.S. Department of Agriculture

*Note: $1NZD = 1233.61 MMK

1 Viss = 1.68 kg

Chapter 1 : Introduction

1.1 Background of the research

Myanmar's economy is primarily based on agriculture, which serves as the backbone of the country. The agriculture sector, which includes crops, livestock, fisheries, and forestry, contributes 38% of the country's total GDP and is crucial not only for ensuring the country's food security but also serves as a primary livelihood for the country's population (Thar et al., 2021). According to Kyaw et al. (2018), around 70% of the country's population lives in rural areas and relies primarily on agriculture for their livelihoods. Additionally, most farmers (80%) are smallholder farmers who play a major role in the country's agriculture (Thar et al., 2021). Agriculture goods are Myanmar's second-largest export after petroleum gas, accounting for 25% to 30% of the country's export earnings (USDA, 2017). The ten major agriculture export crops are rice, pulses, maize, fish, rubber, cattle, groundnuts, sesame, melons, and onions, which together account for more than 80% of the total agri-food exports (Diao et al., 2020).

Tea, which is also known as "Laphet" in Myanmar, is widely cultivated across various regions of the country. According to ILO (2019), tea cultivation in Myanmar is primarily concentrated in Shan State, which accounts for 80% of Myanmar's total tea production. Additional tea cultivation regions in Myanmar are Chin State, Sagaing Division, Mandalay Division, Kachin State, Kayin State, Magway Division and Rakhine Division (Myanmar Tea Association,n.d). According to the Myanmar Tea Association, different types of tea are also produced in Myanmar, including Fermented tea (also called "Pickle tea leaves"), Green tea and Black tea. Fermented tea (Pickle tea leaves) is a unique tea product of Myanmar that is consumed as an edible and widely consumed throughout the country (ILO, 2019). According to the Food and Agriculture Organisation data, Myanmar's tea growing area has increased over the year from 147,000 acres in 1994 to 244,146 acres in 2023.

Additionally, Myanmar's tea production has consistently increased by 6.1% annually since 2014 (FAOSTAT, 2021). With an estimated 132,494 Metric tons produced in 2019, the country was ranked eighth in the world in terms of tea production (FAOSTAT, 2021). Given the upward trend in tea production and the country's ideal climate conditions for growing tea, it is likely that tea production in Myanmar will continue to increase in the future. In addition, strengthening modern technologies and farming techniques could enhance the country's position as a significant player in the global tea industry.

The market for Myanmar tea has steadily expanded over the years, both domestically and internationally (ILO, 2019). Historically, due to Myanmar's historically closed economy and socialist economic system, tea used to be mainly produced for domestic consumption (Thar, 2019). However, a significant shift took place following the country's engagement in political and economic liberalization in 2011. This transformative shift enabled Myanmar's tea industry to enter the global tea market for the first time in 2016 (Lost Tea Company, 2017). Today, Myanmar tea is exported to different countries, including China, Chinese Taipei, the United States, Thailand, and Malaysia, and approximately 3,954 metric tons will be exported in 2021 (FAOSTAT, 2021). As one of the largest tea producers, Myanmar has the potential to become one of the world's top tea exporters by strengthening its production and agricultural technology.

Producer organisations, such as cooperatives, associations, and unions, are essential in the agricultural sector by offering economic and technical services to their members. These organisations aim to improve the livelihoods of smallholder farmers through collective action. In Myanmar, the Myanmar Tea Association (MTA) represents a producer organisation that supports tea farmers by providing technical training, market linkages, and certification for organic products. Since its formation in 2013, the MTA has grown to operate with 20,000 members (Myanmar Tea Association,n.d). It plays a crucial role in helping smallholder tea farmers access essential resources and services such as agricultural inputs, technical training, and market information (ILO, 2019). The MTA empowers farmers to enhance their production practices and access high-value markets. Despite these efforts, the specific impact of producer organisations on the economic outcomes of smallholder tea farmers in Myanmar is not well-documented. Understanding these organisations' role in influencing membership decisions and their subsequent impact on profitability is essential for developing effective support mechanisms and policies. Additionally, the effectiveness of producer associations in the tea sector of Myanmar remains largely unexplored, with little information available about agricultural marketing cooperatives in the country (Esnard, 2021).

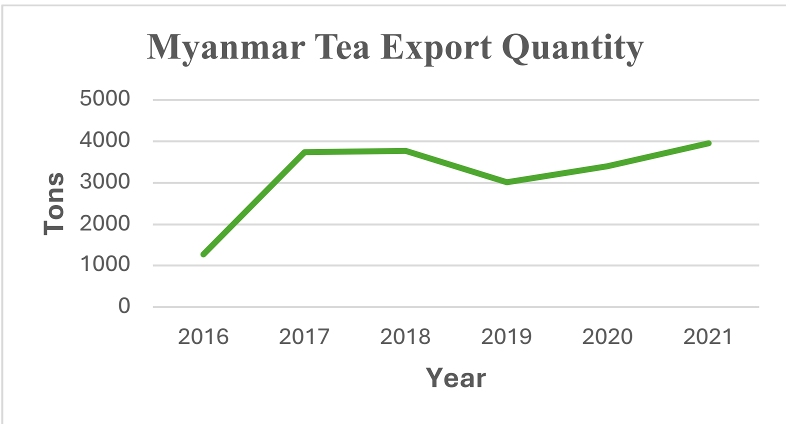


Figure1.1: Myanmar tea export quantity

Source: FAOSTAT

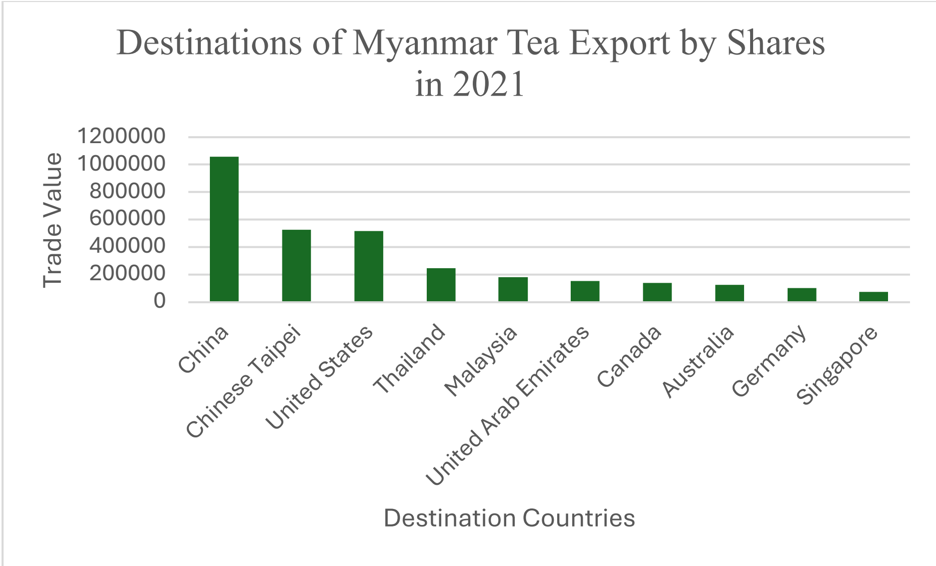


Figure 1.2: Destinations of Myanmar tea export by shares in 2021

Source: FAOSTAT

1.2 Problem statement

Despite Myanmar's ideal conditions for tea cultivation and its status as a major tea producer, smallholder tea farmers face significant challenges that hinder their productivity and profitability. These challenges include limited access to advanced farming techniques, market information, affordable credit, and adequate infrastructure. According to ILO (2019), tea cultivation in Myanmar is usually carried out by smallholder farmers who own between 2 and 3 acres of land. These smallholder tea farmers struggle to access high-value markets due to several factors, including limited knowledge of value-addition techniques, lack of market information, poor access to affordable credit, small scale of the farming operation, poor infrastructure, and inadequate coordination among stakeholders in the tea value chain (Thar, 2019). As a result, the majority of smallholder tea farmers in Myanmar cannot fully capitalise on the potential value of their produce, which hinders their socio-economic development and livelihoods. Producer organisations have been proposed as a solution to these issues by providing various forms of support, such as technical training, market access, collective bargaining for better credit terms, and infrastructure improvements.

In recent years, the concept of producer organisations has gained recognition for its potential to enhance smallholder farmers' economic impact and competitiveness by linking them to high-value markets and addressing various challenges within the value chain. Numerous studies have highlighted the positive impact of producer organisations on market access and value chain development. For instance, Ahmad (2019) discusses how collective action through producer organisations can enhance smallholder farmers' competitiveness by reducing transaction costs and improving bargaining power. Similarly, Widadie et al. (2021) demonstrate that producer organisations play a crucial role in upgrading the value chain through value-added activities, improving network structures, and governance. Further evidence of the benefits of producer organisations is provided by Baga et al. (2023), who found that membership in farmer groups significantly enhanced agricultural productivity among Indonesian rice farmers, as members had better access to quality inputs like improved seeds and fertilisers. Tolno et al. (2015) highlight the role of producer organisations in improving income and profitability by providing better access to markets and resources. Additionally, Fischer & Qaim (2012) found that smallholder farmers in Kenya who were members of producer organisations received higher prices for their products compared to non-members, thanks to improved bargaining power and market access. These studies highlight the importance of producer organisations in promoting sustainable economic growth for smallholder farmers by facilitating access to high-value markets and enhancing their overall economic viability.

In Myanmar, with the initiative of the Government and International Non-Government Organisations, several producer associations and agriculture cooperatives have been formed to enhance the coordination, cooperation, and networking among the actors in the value chain and to collectively address some common challenges, share resources, and negotiate better prices with buyers (Esnard, 2021). There is, however, a notable gap in research concerning the specific impact of producer organisations on the tea industry in Myanmar, particularly for smallholder farmers. This research aims to fill the gap by exploring how producer organisations influence the decisions of tea smallholders to join these organisations and by analysing the impact of membership on their profitability. These insights are crucial for informing policymakers, stakeholders, and organisations on how best to support smallholder tea farmers and enhance their economic outcomes.

1.3 Research questions

a. What factors influence smallholders' decisions to join producer organisations in the Myanmar tea industry?
b. How does membership in producer organisations affect the profitability of tea smallholders?

1.4 Research objectives

a. To identify the key factors influencing tea smallholders' decisions to join producer organisations.
b. To analyse the economic impact of membership in producer organisations on tea smallholders.

c. To provide recommendations for enhancing the role of producer organisations in supporting the profitability and sustainability of tea smallholders.

1.5 Significance of the research

This study provides valuable insights into the economic impact of producer organisations on smallholder tea farmers in Myanmar, a sector that has been under-researched. By quantifying the benefits of membership, particularly in terms of profitability and market access, it contributes to the broader field of agricultural economics. The findings offer empirical evidence that can guide strategies to improve the livelihoods of smallholder farmers in Myanmar and similar contexts across the developing world. This research has the potential to inform policymakers in supporting smallholder farmers, addressing the challenges they face, and highlighting the role of producer organisations in improving market access and infrastructure. These insights can lead to more targeted support, enhancing the effectiveness of producer organisations and fostering sustainable agricultural development in the region.

Additionally, the study offers practical guidance for existing and emerging producer organisations by identifying factors that influence membership decisions and demonstrating the economic benefits of participation. These findings can help organisations refine their strategies to attract and retain members while maximising their impact on profitability and overall economic well-being. By filling a gap in the literature on producer organisations in Myanmar, this research contributes to a deeper understanding of the role of collective action in improving economic outcomes for smallholder farmers. It provides a foundation for future research and offers a framework that can be applied to other agricultural contexts within and beyond Myanmar.

1.6 Thesis overview

The thesis is structured into seven chapters. The first chapter provides the research background, articulates the problem statement, and outlines the research questions and objectives and the significance of the research. Chapter two presents an overview of Myanmar's agricultural sector, emphasising the tea industry. It examines the role of producer organisations, and the challenges faced by smallholder tea farmers. In addition, chapter three comprehensively reviews the relevant literature, exploring concepts related to producer organisations, factors influencing farmers' participation, and the economic impact of membership. This chapter also introduces the conceptual framework that guides the study. Chapter four details the research methodology, including the research design, study area, sampling methods, data collection instruments, and analytical techniques used to assess the impact of producer organisations on smallholder tea farmers. Chapter five discusses pre-interview insights and provides a descriptive sample data analysis, focusing on the surveyed farmers' demographics, farm characteristics, and marketing aspects. Chapter six delves into the research findings, discussing how membership in producer organisations influences the profitability of smallholder tea farmers and evaluating the factors affecting their decisions to join these organisations. The final chapter concludes the thesis by summarising the key findings, offering policy recommendations, and suggesting areas for further research.

Chapter 2 : Overview of the Study Country and Crop Context

2.1 An overview of Myanmar

Myanmar, formerly known as Burma, is the second largest country in Southeast Asia, with a total land area of 676,578 square kilometres and 1920 kilometres of coastline (Myanmar National Portal, 2018). The country shares borders with several countries, including the People's Republic of China to the north and northeast, Laos People's Democratic Republic (Loa PDR) to the east, Thailand to the southeast, Bangladesh to the west and India to the northwest (MIMU, 2023). The economy is dominated by agriculture and farm-related activities, accounting for 38% of gross domestic product (GDP) and 60% of employment (Zorya, 2016).

Naypyitaw is the capital city of Myanmar, though the largest city is Yangon, previously known as Rangoon. The country's landscape can be categorised into five significant topographic and climatic zones: the mountainous area, the Shan Plateau, the central arid zone, the deltaic region, and the coastal stretch (ADB, 2015). Myanmar experiences a tropical to sub-tropical monsoon climate characterised by three distinct seasons. These include the hot and dry inter-monsoon period lasting from mid-February to mid-May, followed by the rainy southwest monsoon season from mid-May to late October. Lastly, the cool and relatively dry northeast monsoon season occurs from late October to mid-February (World Bank Group, 2021). As stated by MIMU Myanmar (2023), Myanmar possesses a coastline stretching over 2,800 kilometres, granting it access to sea routes and deep-sea ports. The nation has abundant natural resources, encompassing fertile land, forests, minerals, natural gas, freshwater, and marine reserves.

Myanmar is one of the world's most diverse countries, with a rich history, diverse culture, religious tradition, and a mix of 135 ethnic groups (MIMU,2023). According to the World Bank (2022), the total population of Myanmar is over 54 million. Approximately 70% of this population resides in rural regions, while the more significant urban concentrations thrive in Yangon and Mandalay (Kyaw et al.,2018). The country comprises 15 administrative divisions, including seven states, seven regions, and a single union territory named Nay Pyi Taw (MIMU, 2023).

Figure 2.1 Administrative map of Myanmar

Source: Maps of the world

2.2 An overview of the agriculture sector in Myanmar

Myanmar is primarily an agricultural country with four key competitive advantages in this sector: abundant land, water, and labour resources (Raitzer et al., 2015). According to ADB (2015), Myanmar possesses 18.2 million hectares (ha) of arable land, with the current cultivation covering only 13.3 million ha (73%). Among the cultivated land, a mere 2.1 million ha (16%) are irrigated during the primary monsoon season, leaving 11.2 million ha (84%) to rely on rainwater. Agriculture is the backbone of Myanmar's economy and the best prospect industry sector, encompassing crop cultivation, livestock rearing, fisheries, and agro-forestry (MIMU,2023). According to Kyaw et al. (2018), 70% of the country's population lives in rural areas and relies primarily on agriculture. In addition, 80% of agricultural producers are smallholder farmers who dominate the agricultural sector (Thar et al., 2021).

Agriculture products are Myanmar’s second-largest export after petroleum gas, contributing to approximately 25% to 30% of the country’s export earnings (USDA, 2017). Among these exports, the top ten agricultural commodities include rice, pulses, maize, fish, rubber, cattle, groundnuts, sesame, melons, and onions, which together account for more than 80% of the total agri-food exports (Diao et al., 2020). Rice is the country's major producing crop, accounting for nearly 43% of the total agricultural production value. Other major producing crops are pulses, oilseeds, maize, cotton, rubber, sugarcane, tropical fruits, and vegetables (ADB, 2015).

2.3 Tea sector in Myanmar

Tea, which belongs to the genus *Camellia*, the species *thea* and family of *theses, is* widely cultivated in various regions of Myanmar (Htwe,2016). As stated by Lu (2021), the objectives of Myanmar's tea sector include fulfilling domestic consumption needs, exporting surplus agriculture products, earning foreign exchange, and supporting rural development through agricultural development. Myanmar cultivates several varieties of tea, including both Camellia sinensis var. sinensis (Chinese tea) and Camellia sinensis var. assamica (Assam tea) (Cowan & Sein, 2020). These varieties produce various types of tea, including green tea, black tea, and fermented tea (pickled tea).

With a tea cultivation history from the 12th century, Myanmar ranks tea as the country's third most extensively cultivated perennial crop (Htwe, 2016). As of 2023, there are approximately 244,146 acres of tea cultivation area, mainly in the hilly regions of central and northern Myanmar (Myanmar Tea Association,n.d). The total annual production of green leaves is around 78 million kg (The Lost Tea Company, 2017). The best quality and major cultivation are in Northern Shan State, and more than half of the total output is from the Namhsan area, a mountainous region in Northern Shan with a deep slope (Htwe,2016).

2.3.1 Tea production in Myanmar

Myanmar is one of the world's top tea producers, and tea cultivation has been practised for centuries in Myanmar. The country has ideal climatic conditions for growing tea. Tea is cultivated in different mountainous regions, predominantly in the country's central and northern parts, with a high altitude, deep slopes, and excellent soil conditions (Cowan & Sein, 2020). The Myanmar Tea Association website reports that in 2023, tea is produced on more than 244,146 acres of land in Myanmar, of which almost 229,242 acres are harvesting areas.

Tea is primarily produced in different regions in Myanmar, including Shan State, Chin State, Sagaing Division, Mandalay Division, Kachin State, Kayin State, Magway Division and Rakhine Division (Lu,2021). Shan State has a long history of cultivation and utilisation of tea. According to ILO (2019), more than 80% of tea is grown in the Shan State, where 58% of tea production takes place in Northern Shan State, and 25% of the country's total production occurs in Southern Shan State, on high altitudes of at least 1,500 meters above sea level. Myanmar's main tea production areas are Namhsan, Manton and Kyaukme in Northern Shan State and Pinlaung, Pindaya and Yatsauk in Southern Shan State (Lu, 2021). The second most cultivated area is the Mandalay Region, followed by Sagain Region and Kachin State.

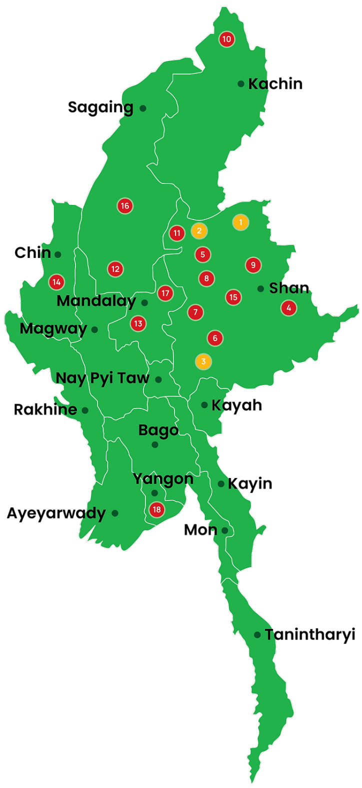
Figure2.2 Tea production in Myanmar

Source: FAOSTAT

Table 2.1 Tea cultivation in different regions (2023-2024)

No.	Regions and States	Areas Under Cultivation (in acres)
1	Shan State (North)	141,492
	Shan State (South)	58,862
	Shan State (East)	6,234
2	Mandalay Region	17,524
3	Sagaing	11,996
4	Kachin State	3,392
5	Chin State	1,171
6	Nay Pyi Taw	1,537
7	Kayin State (Thandaungyi)	1,203

Source: Adapted from Myanmar Tea Association (n.d)



Tea Association
Tea Cluster

1	Kokang
2	Palaung
3	Thandaungyi
4	Eastern Shan
5	Kyaukme
6	Pinlaung
7	Pindaya
8	Ywangan
9	Lawksawk
10	Putao
11	Mogoke
12	Monywa
13	Thedaw-wundwin
14	Chin
15	Loilen
16	Sagaing
17	Mandalay
18	Yangon

Figure 2.3 Tea growing and production area in Myanmar

Source: Adapted from Myanmar Tea Association (n.d)

2.3.2 Myanmar tea products

According to the Myanmar Tea Association, different types of tea, including Fermented tea, also called pickle tea leave (Laphet-so), Dried tea (Laphet-chauk), and Black tea (Acho chauk), are produced in Myanmar (Myanmar Tea Association,n.d). According to Htwe (2016), Green tea accounted for 20% of production, black tea 70% and pickled tea 10%. While green tea and pickled tea are widely used at the household level across the country, black tea is mainly consumed in teashops. Many types of dried tea are manufactured, including traditional roasted tea, sun-dried tea, dried fermented tea, green tea, old tree tea, herbal tea, and white tea. Additionally, two different types of black tea, orthodox black tea and CTC black tea are produced in Myanmar (Myanmar Tea Association,n.d).

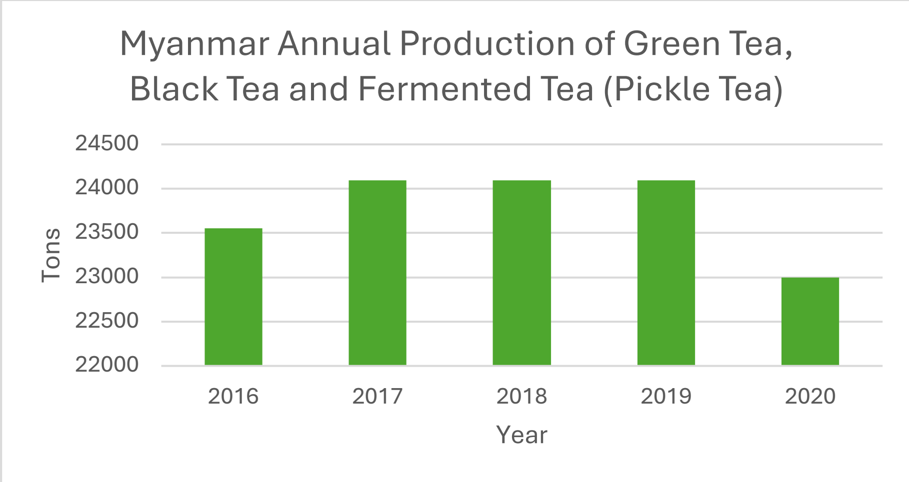


Figure 2.4 Annual production of different types of tea products in Myanmar

Source: FAOSTAT

2.3.3 Tea marketing in Myanmar

There are three primary distribution channels. According to Thar (2019), farmers who choose not to process their tea sell the freshly plucked leaves to local factories. These local factories undertake the tea processing and subsequently distribute the processed tea to either local distributors or directly to consumers. Those who process their tea at the household level have to find channels to market. Commodity traders or brokers commonly fill this role. Those brokers tend to have greater access to market information and intimate knowledge of some remote regions where tea is cultivated. They act as the intermediary between production and wholesale: collecting green and fermented tea from small-scale producers and selling them to wholesale markets in Pindaya, Aungban, Mandalay, and elsewhere for a more significant profit. Finally, smallholder tea farmers with organic certificates sell their products directly to local enterprises, which export these organic goods directly to the international market.

2.3.4 Government policies on tea production in Myanmar

Since tea is not considered a priority crop by the Myanmar government, it has received limited support from governmental initiatives since its early days. Due to Myanmar's historically closed economy and socialist economic system, tea used to be mainly produced for domestic consumption (Thar, 2019). This is because opportunities for international export in the tea industry were minimal as the Myanmar government's strict economic policies restricted international trade using various trade barriers (Thar, 2019). However, commencing in 2000, the government shifted its approach to promoting tea cultivation as a strategy to eliminate opium poppy fields. This involved distributing seeds, introducing modern tea varieties, and establishing consistent pest and disease monitoring services for tea plantations, resulting in a notable increase in cultivation areas and annual yield (Thar, 2019). In addition, Myanmar entered the international tea market for the first time in 2016 after the economic sanctions were lifted in 2013. According to ILO (2019), around 80 Myanmar companies export tea mainly to Japan, Malaysia, and Singapore, while a handful export fermented tea to buyers in the UK and Ireland. While specific government policies promote tea production, the tea sector does not hold a high-priority position within the government's agenda, resulting in limited support (ILO,2019).

2.3.5 Challenges faced by smallholder tea farmers

The Myanmar tea sector is facing several challenges. The tea value chain in Myanmar is also constrained by weak extension services, poor linkage of research and extension, and insufficient and ineffective handling, including storage, packaging, and transportation systems (ILO,2019). According to Thar (2019), at the farm level, farmers need help in tea cultivation. These include labour shortage, lower price and yield, lack of input and credit for investment, lack of technology, lack of farm gate margin and restricted financial capacity for attaining the organic certificate.

Labour shortage during the harvest season, especially during Shwe Phe Oo (meaning “very first harvest”, is a major constraint faced by tea farmers in Myanmar (Htwe,2016; Thar,2019). According to Htwe (2016), tea plucking is a labour-intensive task that demands timely execution to achieve total productivity. However, due to the labour shortage, tea leaves are often harvested later than the optimal time, resulting in a decline in the quality of the leaves (Thar,2019). In addition, the inadequate labour force for processing leads farmers to sell green tea leaves directly to the processor (Htwe,2016). Limited availability of resources and lack of access to credit are other significant problems tea farmers face when expanding land for tea farming. Htwe (2016) states that agriculture loan subsidies still need to be supported by tea farmers in Myanmar. Although farmers are willing to expand their tea farming, their income is just enough to cover the cost of labour charges and family expenditures (Thar,2019; Htwe, 2016).

In addition, the majority of tea production in Myanmar appears to take place on a very small scale (ILO, 2019). Most tea farmers in Myanmar apply traditional cultivation and processing methods, which often lead to low yields and, in some cases, low-quality tea leaves. According to ILO (2019), most of the tea farmers in Myanmar need more means to add significant value to the products they make from fresh tea leaves, whether green tea or fermented tea. They usually process their harvested leaves within the home using traditional methods, resulting in lower quality end-products and a corresponding low value. For instance, farmers use the sun-drying techniques for green tea production.

2.4 Overview of producer organisations (cooperatives) in Myanmar

The cooperative movement in Myanmar, formerly known as Burma, originated in the early 20th century during British administrative rule (ICA-AP, 2020). Cooperative was first introduced to

Myanmar in 1904 when the Indian Cooperative Societies Act was enacted. Initially, cooperatives were viewed as externally imposed and controlled organisations influenced by British rule. However, following independence, Myanmar's cooperatives transitioned into state-controlled entities focusing on the agricultural and financial sectors to promote socialism (ICA-AP, 2020). Consequently, cooperatives became closely associated with the government and deviated from cooperative values and principles (Ferguson, 2013).

In 1992, Myanmar introduced a new cooperative law as part of its shift toward a market economy to revitalise the cooperative system. However, as private companies entered the market, state-led cooperative entities found it challenging to compete. Producer cooperatives, which received government financial support, could not compete effectively and eventually disbanded (Win,2019). Starting in 2013, the government initiated a program to establish one cooperative in each village, leading to the registration of 40,000 cooperatives under the 1992 cooperative law (Ferguson,2013).

The cooperative system in Myanmar is organised into a clear hierarchy, including primary societies, federations at the township level, unions at the state or regional level, and a national apex (FAO & LIFT, 2016). In Myanmar, there are three primary types of cooperatives: agricultural cooperatives, financial cooperatives, and trading cooperatives (Win, 2019). Each of these cooperatives has its own National Union. As of 2019, there were 39,929 cooperatives in Myanmar, with 27,655 agricultural cooperatives (FAO & LIFT, 2016).

2.4.1 Concept and principles of producer cooperatives in Myanmar

In Myanmar, there are no special laws for types of cooperatives (ICA-AP,2021). The ICA principles are explicitly referred to in the Cooperative Societies Law 1992 preliminary. According to ICA-AP (2021), while there are only seven principles in ICA, there are ten principles in Myanmar Cooperative Laws. The following are the ten principles of Myanmar Cooperative Laws:

1. To form a society with persons who wish to participate of their own volition.
2. A member or a representative has an equal right of one person, able to give one vote and administer all transactions of the society only according to the wishes of the majority.
3. To restrict the benefit to be derived for the share subscribed in the society (Democratic member control)
4. To apportion the net profits accrued from the business of the society according to the decision of the members (Economic participation)
5. To carry out dissemination of cooperative concepts and technique
6. To ensure effective cooperation among cooperative societies in and outside the country (Cooperation Among Cooperatives)

7. To enable the society to be only an organisation carrying out economic and social activities of the society (Autonomy and independence)
8. To raise the standard of living of the members and member societies by working with the objective of the interests of the same
9. To enable the members or member societies to become participants in the economic and social activities of the society.
10. To enable the society to become an organisation administering according to the wishes of the majority by combining service and property in the interest of the members, member societies and equity business partners.

2.4.2 Challenges faced by the producer organisations (cooperatives) in Myanmar

Producer organisations in Myanmar face several key challenges that limit their effectiveness. One of the significant challenges for cooperatives in Myanmar is the long-standing mistrust of cooperatives among farmers (FAO & LIFT,2016; Ferguson,2013; Esnard, 2021). Historically, the government's involvement in cooperatives under the socialist regime has ruined its reputation (FAO & LIFT,2016; Ferguson,2013). Oo (2019) highlighted that after independence, the government prioritised its objectives over cooperative principles, resulting in passive member involvement. As a result, cooperatives have long been perceived as state-controlled entities, with farmers feeling little ownership, autonomy, or control. This negative perception has continued discouraging farmers from fully engaging with cooperatives (Ferguson, 2013).

Another critical challenge is the gap between the Cooperative Society Rules and their implementation. While these rules, in theory, provide the framework for well-structured and efficiently run cooperatives, particularly in terms of institutional arrangements, the practical application of these regulations is limited (Esnard, 2021). For example, the regulations set out in the 1992 Co-op Law emphasise a top-down cooperative structure with minimal involvement from members at higher levels of management (FAO and LIFT, 2016). This has led to a lack of transparency and weak governance in many cooperatives, especially agricultural marketing cooperatives.

In addition, to avoid being associated with government-run cooperatives, many farmer-driven initiatives supported by International Non-Governmental Organizations (INGOs) have opted to form Producer Groups (PGs) or Producer Organisations (POs) that adopt some cooperative principles but avoid formal registration as cooperatives (Ferguson,2013, Esnard,2021). This allows them to distance themselves from the government and operate more independently, but it also limits their access to certain benefits that formally registered cooperatives might enjoy. As

Esnard (2021) highlighted, these PGs or POs cannot qualify for term loans from commercial banks, limiting their ability to invest in productive assets. While Microfinance Institutions (MFIs) offer some loans, these are typically short-term, with repayment terms unsuitable for long-term investments in value-adding activities (Esnard,2021). This lack of financial support further hinders the growth and development of the PGs and POs. Additionally, access to loans often depends on land ownership, excluding landless farmers, while wealthier farmers, who don't need loans, have little motivation to join cooperatives (FAO & LIFT,2016)

Chapter 3 : Literature Review

This study aims to analyse the role of producer organisations, focusing on the determinants of membership and the economic impact of membership on smallholder tea farmers in Southern Shan State, Myanmar. This chapter reviews the relevant literature and is structured into five main sections. First, it introduces the concept of producer organisations, detailing their various structures and functions, including different types such as cooperatives, associations, and unions, and their significant roles in collective action. Second, it explores the factors that influence membership in producer organisations, examining demographics, farm characteristics, marketing and institutional determinants, barriers to membership and incentives for smallholders to join these organisations. Third, it reviews empirical studies on the economic impact of membership in producer organisations, assessing how membership affects smallholder farmers' income, productivity, access to markets, and overall financial well-being. Fourth, the chapter highlights the role of producer organisations in facilitating organic certification for smallholders. Finally, the chapter summarises the literature review and presents the conceptual framework for this study.

3.1 Concept of producer organisations

The concept of farmers working together collaboratively is not a new phenomenon in agricultural development. Farmers have been encouraged to establish themselves as associations or cooperatives to achieve better income for the producers through self-organisation (Falkowski & Ciaian, 2016; Fischer & Qaim, 2012). Many researchers define a producer organisation as a rural business that is owned and controlled by producers, participates in collective marketing activities, and provides services and products to its members (Kormelinck et al., 2019; Falkowski & Ciaian, 2016; Bijman, 2016). These producer organisations are involved in a wide range of activities, which include economic functions like the collection, processing, and marketing of agricultural products, the implementation of quality assurance programmes, capacity building, and coordination (Ton & Bijman, 2006; Bienabe & Sautier, 2005; Bijman, 2018).

Various terms refer to these agricultural producer organisations that offer economic and technical services (Falkowski & Ciaian, 2016). Some of the common terms include 'farmer organisation', 'producer group', 'marketing group', 'agricultural cooperative', ‘producer and marketing group’, ‘agricultural cooperative’, ‘producer-owned enterprises’ or ‘member-owned firms’, ‘self-help group’, and farmers’ associations (Bijman, 2016; Esnard, 2019; Bienabe & Sautier, 2005). Although these terms might vary in different regions or contexts, the common goal among all these organisations is to enhance the well-being of their members (Bijman, 2018; Esnard, 2019). They aim to provide producers with greater benefits than they would achieve by working as individuals (Esnard, 2019). In addition, they are all viewed as possible institutional solutions to overcome high transaction costs and market failures in developing countries (Groot Kormelinck, Bijman, & Trienekens, 2019; Markelova et al., 2009). In this study, the terms producer organisation and association are used interchangeably to describe the farmers working collectively to benefit their members.

3.1.1 Different structures and functions of producer organisations

Identifying a producer organisation depends on characterising its functions and goals (Falkowsk & Ciaian, 2016). According to Groot-Kormelinck et al. (2022), producer organisations exist in formal and informal structures, varying in size, membership types, objectives, values, internal governance, and other organisational characteristics. It is important to recognise the main functions and organisational structure of producer organisations to fully understand how they operate, particularly in a competitive market (Bijman, 2016). This understanding is crucial because, for the organisation to be effective, its structure and strategies must be in alignment. Producer organisations can be categorised into informal and formal (Bijman, 2016). For instance, while informal organisations typically prioritise the local community, managing interactions among residents, formal organisations take an external perspective, facilitating relationships between community members and external economic institutions and political stakeholders beyond the agricultural community (Bernard et al., 2008; Hussein,1990).

Additionally, it is found that a clear functional distinction can be made between two primary types of producer organisations (POs): community-based organisations and commodity-based organisations (Bernard et al., 2008; Ton & Bijman, 2006; Bijman, 2016). While community-based organisations emphasise the welfare of their community members through a holistic approach involving economic, social, and political functions, commodity-based organisations, such as marketing cooperatives, primarily concentrate on the financial aspects of marketing and processing agricultural products from their members' farms. At times, a producer organisation (PO) is established to facilitate the production and marketing of a solitary cash crop, often called single-purpose cooperatives (Ton & Bijman, 2016). In practice, these POs usually offer a wide range of services to their members, addressing the diverse needs of their farming systems, including input supply and multi-product marketing and processing.

3.1.2 Significance of collective action through producer organisations

In recent years, an increasing body of research has emphasised the significance of producer organisations and collective action groups in addressing market inefficiencies and enhancing smallholder farmers’ access to agricultural resources and markets. Notably, scholars have emphasised the importance of collective action through producer organisations in enabling smallholder farmers to remain competitive in the rapidly changing environment. In these studies, collective action is defined as a group's proactive activity of shared interests, directly or through an organisation (Devaux et al., 2009; Markelova et al., 2009). Meinzen-Dick et al. (2004) further define collective action as voluntary group involvement centred on shared interests and joint actions to pursue these interests.

Moreover, the literature suggests that collective action enhances smallholder farmers' engagement with the agri-food value chain, especially in developing countries (Ahmad, 2019). Several studies have revealed that smallholders in developing countries often face many challenges in competing in high-value markets due to multiple factors, including low productivity, high transaction costs, inadequate market institutions, governance issues, and limited access to rural finance (Markelova et al., 2009; Narrod et al., 2009). These studies suggest that collective action emerges as a promising avenue for resolving these challenges, allowing smallholders to pool resources and capability for more effective market participation.

Narrod et al. (2009), highlight collective action as an evident solution for the challenges faced by smallholder farmers. Case studies, such as the investigation into the rice value chain in Yogyakarta, Indonesia, reveal that collective action has enabled smallholder rice farmers to strengthen their competitive edge, enhance production capacity, improve product quality, and amplify their bargaining power (Ahmad, 2019). Similarly, the research by Shiferaw et al. (2011) illustrates how collective action facilitates direct connections between producers and higher-value segments of the value chain, bypassing intermediaries and fostering direct linkages with urban wholesalers, high-value retailers, processors, and exporters.

3.2 Factors influencing membership in producer organisations

As the importance of producer organisations in supporting smallholder farmers has been increasingly recognised, many studies have explored the factors influencing smallholder farmers' membership in these organisations. Previous studies have identified various factors that influence farmers' decisions to join producer organisations, which can be grouped into demographic factors (gender, age, education level, off-farm engagement, household size, farming experience), farm characteristics (farm size, production volume, farming practices) market aspects (certification, market information, prices), and institutional factors (extension services, technical support, input support) (Adong et al., 2012; Aku et al., 2018; Ekepu et al., 2017; Gurung et al., 2023; Gashaw et al., 2018; Fischer & Qaim, 2012; Tolno et al., 2015; Vu et al., 2020; Yogitha et al., 2023). These studies collectively suggest that understanding these factors is crucial for developing effective strategies to encourage broader membership and maximise the benefits for smallholder farmers.

3.2.1 Farmer demographics

Studies have shown that demographic factors such as age, gender, education level, off-farm activity and farming experience can significantly influence farmers' decisions to join producer organisations (Adong et al.,2012; Awotide et al., 2015; Ekepu et al.,2017; Gurung et al., 2023; Kayitesi, 2019; Nugussie, 2010; Tolno et al., 2015; Yogitha et al., 2023). For instance, research by Awotide, Awoyemi, and Fashogbon (2015) on smallholder rice farmers in Nigeria shows that younger farmers are more inclined to join cooperative organisations. This is because younger farmers tend to be more risk-neutral and open to change than older farmers. Moreover, the study found that each additional year of age significantly reduces the likelihood of joining a cooperative organisation by 2.8%. On the contrary, several studies across different regions and agricultural contexts consistently show that older farmers are more likely to join producer organisations due to their experience, established social networks, and recognition of the benefits provided by these organisations. (Adong et al.,2012; Kayitesi, 2019; Matchaya,2010; Tolno et al., 2015).

Gender significantly influences farmers' decisions to join producer organisations. Various studies highlight the barriers and disparities faced by women in these organisations compared to their male counterparts. For instance, studies on smallholder dairy farmers show that male farmers are more likely to be involved in decision-making processes within producer organisations. In contrast, women and poor farmers are often excluded (Mwambi et al., 2020). Towo (2004) also found that women in Tanzania participate less in farmer groups due to a lack of gender sensitisation and heavy domestic workloads. However, some findings suggest that women are more likely to join producer organisations. Ekepu et al. (2017) noted that male farmers are 16.19% less likely to engage in potato production, a sector viewed as a women’s activity. Moreover, Adong et al. (2012) found that male farmers are 0.8% less likely to be group members than female farmers (Adong et al., 2012).

The level of education is a critical factor in farmers' decisions to join farmer groups, with more educated individuals more likely to become members. This is due to their greater awareness of the benefits associated with group membership (Adong et al., 2012; Gurung et al., 2023; Zheng et al.,2012 Rokhani et al., 2021; Wang et al., 2019). However, while education is often highlighted as necessary, several studies argue that its influence may not be as substantial as other factors (Datta et al., 2018; Pan, 2011; Fischer & Qaim, 2012; Yogitha et al.,2023).

A study by Ahado et al. (2021) observed that farmers engaged in off-farm work are 14.8% more likely to join cooperatives. In addition, previous studies indicated that households with income from off-farm activities have positively influenced farmers' decisions to join producer organisations (Adong et al., 2012; Tolno et al., 2015; Vu et al.,2020). This is because producers join farmers' groups to benefit from access to farm inputs and output markets. Conversely, other studies indicate that off-farm engagement can reduce the time and commitment available for participation in producer organisations. Financial independence from off-farm income may also lessen the perceived need to join such groups (Ekepu et al.,2017; Gashaw & Kibret, 2018).

3.2.2 Farm characteristic

Farm size is a significant determinant in the decision to join producer organisations. Previous studies suggest that larger farms often have greater resources and higher production capacities, making them more likely to participate in producer organisations to access better markets, negotiate prices, and obtain reduced-cost inputs. For instance, Adong et al. (2012) and Fischer and Qaim (2012) found that larger farms are more inclined to join these organisations because they can benefit from economies of scale and enhanced bargaining power. Larger farms can leverage the collective strength of the organisation to secure better deals on inputs and outputs, thus increasing their profitability. Conversely, several research shows that farm size does not always have a significant effect on a farmer's decision to join a producer organisation (Gurung et al.,2023; Gashaw et al.,2018; Mojo et al.,2017; Datta et al.,2018).

In addition, studies suggest that the farming experience encourages farmers to join producer organisations as it helps them recognise the benefits of collective action, market access, better prices, and decision-making power (Gurung et al.,2023; Vu et al.,2020; Etim et al.,2021). In Northeast India, experienced farmers were more inclined to join FPOs due to their better knowledge of agricultural practices and market dynamics, resulting in improved incomes and market access (Gurung et al., 2023). In addition, according to Vu et al. (2020), farmers with more farming experience are more likely to join tea associations in Vietnam, as their experience positively influences the decision-making process. Conversely, the study by Etim et al. (2021) suggests that the farming experience negatively affects farmers' decisions to join producer organisations.

Similarly, yield, or the amount of produce harvested, is another important factor influencing the decision to join producer organisations. Farmers with higher yields are often more motivated to join these organisations to ensure better marketing opportunities and price stability. Mukarumbwa et al. (2018) found that high-yield farmers are more likely to join producer organisations as they seek better marketing opportunities and price stability through collective action. Birachi et al. (2011) explain that smallholder producers with more significant farm outputs are more likely to supply a greater proportion of products to markets. High-volume producers tend to be more involved in commercial farming than those with smaller outputs.

3.2.3 Marketing aspects

Regarding market aspects, prices play a significant role in farmers' decisions to join producer organisations. Higher and more stable prices are often available through these organisations due to collective bargaining power and better market access. Fischer & Qaim (2012) found that producer organisations can negotiate better prices for their members' produce, thus providing an economic incentive to join. Tolno et al. (2015) also noted that price stability offered by these organisations helps farmers manage income volatility, making membership more attractive. In Kenya, a study found that producer organisations, especially bargaining POs, significantly improved smallholder dairy farmers' market access and bargaining power, leading to better prices and economic benefits (Mwambi et al., 2020).

Distance to the market is another critical factor. Farmers far from markets face higher transportation costs and more significant logistical challenges, which can discourage them from participating in formal markets. Several studies indicate a positive relationship between distance to market and membership in producer organisations (Yogitha et al.,2023; Mishra & Vedasri, 2021; Gurung et al., 2023; Adong et al., 2012; Bernard et al., 2010). Yogitha et al. (2023) found that the distance to the market positively influences Farmer Producer Organisation participation in Madurai District, India; the farther the market, the higher the likelihood of joining due to transportation facilities provided. In addition, in Andhra Pradesh, India, and Northeast India, farmers farther from markets were more likely to join Farmer Producer Organisations (FPOs) to gain better market access and enhance income (Mishra & Vedasri, 2021; Gurung et al., 2023). Similarly, research in Uganda and Ethiopia found that remote farmers joined cooperatives and producer organisations to overcome market access barriers and reduce transportation costs (Adong et al., 2012; Bernard et al., 2010).

Access to certification positively influences farmers' decisions to join producer organisations by providing better market access, higher prices, and enhanced credibility. A study on coffee producers in Brazil found that group certification under the Sustainable Agriculture Network–Rainforest Alliance system increased market access for small and medium-sized producers, encouraging more farmers to join producer organisations (Pinto et al., 2014). Kuan et al. (2021) discovered that organisational membership significantly affected farmers' adoption of TAP and organic labels. This result implies that the activities and shared knowledge within agricultural groups help farmers efficiently access information and resolve issues related to group certification and marketing. Similarly, research on certified organic agriculture in China and Brazil indicated that certification improved market access and income for small-scale farmers, with cooperatives playing a crucial role in facilitating access (Oelofse et al., 2010). Certification also enhances product quality and safety, making it easier for farmers to access local and international markets (Gashaw et al., 2018).

3.2.4 Institutional factors

Previous studies revealed that Access to extension services is a significant factor in farmers' participation in producer organisations, as it enhances knowledge, provides market information, and lowers transaction costs. Studies in India, China and Guinea show that better extension access correlates with higher membership in producer organisations (Tolno et al., 2015; Datta et al., 2018; Vedasri & Mishra, 2021; Gashaw et al., 2018; Gurung et al., 2023; Manda et al., 2020). For instance, the study by Tolno et al. (2015) revealed that access to extension services significantly increases group membership by 38.34%. This is likely because better-informed agricultural extension agents discuss and influence farmers' decisions about joining farmers' groups. Extension services also promote sustainable practices and build social capital, motivating farmers to join (Ofolsha et al., 2022; Srinithi et al., 2021). Contrarily, Adong et al. (2012) reported a negative relationship between extension access and membership in Uganda.

Regarding market support, studies consistently show that such support mechanisms enhance farmers' market performance, increase their bargaining power, and improve their welfare (Yogitha et al.,2023; Aku et al.,2018; Fisher & Qaim, 2012; Shiferaw et al.,2009). The study by Yogitha et al. (2023) revealed that market support provided by FPOs attracts farmers by offering a support system that eliminates intermediaries and secures better prices for their produce. Similarly, Aku et al. (2018) found that market access provided by farmer organisations positively and significantly impacts farm income. Smallholder vegetable farmers with access to these markets earn more per season than those without group membership. Fischer & Qaim (2012) highlighted that producer organisations improve market access for smallholders by facilitating efficient information flows, which is essential for adopting innovations and increasing marketable surplus. Shiferaw et al. (2009) noted that Producer Marketing Groups (PMGs) in Kenya assist small producers through the coordination of production and grain marketing, improving access to market information and technology, which enhances marketable surplus and income.

On the one hand, several studies revealed that credit access is another factor, particularly in developing countries (Vu et al.,2020; Tolno et al.,2015; Sekyi et al.,2020; Nordjo & Adjasi,2019). Credit enhances financial capacity, market involvement, productivity, and technology adoption, making membership in producer organisations more attractive. Vu et al. (2020) found that better credit access in Vietnam positively influences farmers' decisions to become association members by enabling them to meet the required conditions. In Middle Guinea, Tolno et al. (2015) found that access to credit significantly influences producers' decisions to join farmer groups. A unit increase in credit access raises participation probability by 27.16%, as credit helps farmers meet group membership demands, particularly benefiting poor households. In Ghana, credit access increases agricultural commercialisation and income growth (Sekyi et al., 2020), and it facilitates the adoption of improved practices and technologies, boosting productivity (Nordjo & Adjasi, 2019). However, some studies show a negative association between credit access and participation in producer organisations. For instance, in Soroti district, low credit levels meant no significant impact on membership (Ekepu et al., 2017). In Nigeria, credit access enhanced technology adoption and welfare but did not influence cooperative membership (Wossen et al., 2017). In Ethiopia, credit access was not a key factor in membership decisions despite improvements in income and assets from cooperative membership (Mojo et al., 2017).

3.3 Economic impact of membership in producer organisations

Producer organisations have become increasingly recognised for their role in enhancing the economic conditions of smallholder farmers. Findings from previous studies indicate that membership in producer organisations can lead to higher incomes, greater productivity, better access to credit, and reduced transaction costs (Gurung et al.,2023; Wang et al.,2019; Mishra & Vedasri, 2021; Kayitesi,2019; Poungchompu & Phuttachat,2023).

3.3.1 Income and profitability

Membership in producer organisations can significantly enhance farmers' income and ensure price stability. Various studies have highlighted that collective marketing strategies employed by producer organisations enable farmers to negotiate better prices for their produce and achieve higher income. For instance, the Gurung et al. (2023) survey investigates the economic impact of Farmer Producer Organisation (FPO) membership on organic farming households in Northeast India. Using Propensity Score Matching (PSM) to assess the impact of membership, the findings from the study revealed significant economic benefits for FPO members. Specifically, FPO membership results in higher annual net returns (Rs. 7,254–8,133), a greater return on investment (4.6–4.8%), and increased profit margins (8–8.4%) compared to non-members in the region.

Similarly, the paper by Aku et al. (2018) evaluates the impact of market access provided by farmer organisations on the income of smallholder vegetable farmers in Babati District, Tanzania. Using Propensity Score Matching (PSM), the study found that market access via farmer organisations significantly increased farm income. Smallholder farmers with market access earned more per season (USD 220.11) than those without (USD 177.90). Additionally, transport costs and distance to market were lower for members (USD 0.22 per trip) than non-members (USD 0.68 per trip). In addition, using Propensity Score Matching (PSM), Fischer & Qaim (2012) found that smallholder farmers in Kenya who were members of producer organisations received higher prices for their products than non-members due to better bargaining power and market access.

Mojo et al. (2017) applied both Propensity Score Matching (PSM) and Endogenous Switching Regression (ESR) to examine the effect of coffee cooperative membership on farmers' income in rural Ethiopia. The results from both PSM and ESR models show that cooperative membership is associated with higher household income and assets. Additionally, the ESR results suggest that cooperative members achieve significantly better economic outcomes compared to if they were non-members, and non-members would have benefited economically from joining cooperatives. In addition, Wang et al. (2019) used causal mediation analysis to estimate the impact of agricultural cooperatives on farm profits in Taiwan. This method helps to identify and quantify the mechanisms through which cooperative membership affects farm profits, mainly focusing on food label certifications as a mediator. The study found that participating in agricultural cooperatives significantly increased farm profits. The use of food labels accounted for approximately 15% to 28% of the total effect of cooperative participation on farm profits. In addition, the study by Tolno et al. (2015) uses Heckman's two-step approach to investigate the economic impact of membership in farmer organisations on smallholder potato farmers in Middle Guinea. The findings revealed that membership in producer organisations was associated with a 25% increase in income for smallholder farmers. The organisations facilitated bulk selling, reducing transaction costs and improving price stability.

3.3.2 Farm productivity

Producer organisations often provide members with better access to high-quality inputs and technical training, which can enhance productivity. The studies by Wossen et al. (2017), Baga et al. (2023), and Donkor et al. (2023) provide substantial evidence of the positive impact of producer group membership on farm productivity. For instance, the study by Wossen et al. (2017) examines the effects of membership in producer organisations on the productivity of smallholder farmers in Ethiopia. Using Propensity Score Matching (PSM), Inverse Probability Weighted Regression Adjustment (IPWRA), and Endogenous Switching Regression (ESR), the findings revealed that membership in producer organisations significantly increased productivity among smallholder farmers. The provision of extension services and agricultural training helped farmers adopt new technologies and improved farming practices, leading to higher yields and better-quality produce.

Similarly, the study by Baga et al. (2023) explores the relationship between farmer group membership and agricultural productivity in Indonesian rice farming. Using PSM, the study found that membership in farmer groups significantly enhanced agricultural productivity among rice farmers in Indonesia. Members had better access to quality inputs, such as improved seeds and fertilisers, contributing to higher yields. Additionally, the provision of extension services and agricultural training by farmer groups played a crucial role in helping farmers adopt new technologies and improved farming practices. The study by Donkor et al. (2023) analyses the impact of membership in producer groups on the productivity and technical efficiency of smallholder cocoa farmers in Ghana. Using the Endogenous Treatment Regression model, the findings revealed that producer group membership significantly increased productivity and technical efficiency among smallholder cocoa farmers.

3.4 Role of producer organisations in facilitating organic certification for smallholders

With increasing awareness of conventional food production methods, there is a growing interest in eco-friendly and sustainable farming practices. Organic farming, which emphasises environmentally friendly and sustainable agricultural practices known for its sustainable practices, is becoming famous for its potential to improve agricultural efficiency, revenue, food safety, and environmental protection (Kumar et al.,2022; Stoian & Căpriță,2019). Certification plays a crucial role in ensuring organic products' reliability and quality, facilitating access to high-value markets (Barrett et al.,2001; Lohr, 1998). However, certification's high costs and complexity can be significant barriers for smallholders (Barrett et al., 2001; Watts et al., 2021; Giovannucci, 2005). Producer organisations support farmers by reducing these barriers through collective action, training, and establishing market linkages (Barrett et al., 2001; Steidle & Herrmann, 2019; Pinto et al.,2014). Pro-producer organisations enable smallholders to participate in high-value markets by facilitating access to group certification, thus contributing to economic development.

3.4.1 Importance of certification

As one of the critical components of sustainable agriculture, organic farming relies on ecological processes, biodiversity, and cycles adapted to local conditions rather than synthetic inputs. Organic farming practices include crop rotation, green manure, compost, and biological pest control to maintain soil productivity and control pests (Dorais,2021; Sharma,2019; Gros & Vukasin, 2010). Certification is critical as it verifies that products meet specific organic standards set by certifying bodies (Lohr, 1998; Tovar et al.,2015). This is essential for smallholder farmers aiming to enter high-value organic markets with high consumer demand for organic products (Barrett et al., 2001).

Certification offers several competitive advantages, including enhanced market access, consumer trust and environmental benefits. One of the primary benefits of certification is market access. According to a study by Barret et al. (2002), certification can serve as a gateway to domestic and international markets, particularly for producers in developing countries. Smallholder farmers in Uganda with organic certification experienced a 75% increase in net revenue, contributing 12.5% to household income due to premium market access and guaranteed price premiums. Additionally, using organic techniques increased net coffee revenue by 9% through improved yields (Bolwig et al., 2009). Similarly, Kleemann et al. (2014) reported that Ghanaian pineapple farmers who achieved organic certification saw a significant income rise due to higher prices in export markets. Furthermore, a study by Oelofse et al. (2010) highlighted that certification improves market access for small-scale farmers in China and Brazil, leading to better prices, incomes, and market opportunities for organic products.

Building consumer trust is another significant advantage of certification. According to Lohr (1998), certification guarantees consumers that the products they purchase meet stringent organic standards. This trust is essential for sustaining demand in high-value markets. Without accreditation, consumers may be skeptical about the authenticity of organic claims, which could undermine market growth. Certified products often meet stringent quality and safety standards, making them more attractive to retailers and consumers increasingly concerned about product origins and manufacturing practices (Henson & Reardon, 2005). Additionally, certified organic farming practices contribute to environmental sustainability by promoting biodiversity, improving soil health, and reducing pollution from synthetic chemicals. These practices enhance ecosystem services and can lead to more resilient agricultural systems (Tahat et al., 2020).

3.4.2 Challenges faced by smallholders in achieving organic certification

Despite its benefits, achieving organic certification independently presents significant challenges for smallholder farmers, including high costs, complex certification processes, and the need for technical knowledge and market linkages (Barrett et al., 2001; Watts et al., 2021; Giovannucci, 2005). The process involves substantial costs and complex standards, which can be prohibitive for small-scale farmers. These costs include application fees, annual renewal fees, and the expense of compliance with certification standards (Barrett et al., 2001). Giovannucci (2005) highlights that the costs associated with organic certification can be expensive for smallholder farmers, making it difficult for them to enter and remain in organic markets. Additionally, obtaining organic certification involves complying with stringent regulatory standards and undergoing regular inspections. Smallholder farmers must maintain detailed records and documentation to demonstrate compliance with organic standards, which can be overwhelming and time-consuming. Watts et al. (2021) report that the complexity of the certification process is a significant barrier for smallholder farmers in Indonesia. Similarly, in Ethiopia, Bernard et al. (2010) highlight that smallholder farmers need help accessing organic inputs and markets, hindering their certification.

3.4.3 Enhancing organic certification through producer organisations

Several empirical literatures demonstrate that producer organisations support smallholder farmers to achieve organic certification (Barrett et al., 2001; Gadzikwa et al., 2006; Steidle & Herrmann, 2019; Pinto et al.,2014). Through training and education, financial assistance, collective certification, technical support, and market access, these organisations help farmers overcome the barriers associated with organic certification. Collective action through producer organisations helps smallholder farmers achieve economies of scale and reduce certification costs. For instance, by forming producer groups, smallholders can share certification costs, gain better access to information and resources, and achieve economies of scale. This collective action is essential for making certification more accessible and affordable (Steidle & Herrmann, 2019; Barrett et al., 2001). In addition, according to Barrett et al. (2001), the development of market linkage is essential for the success of organic trade. For smallholder farmers, forming producer groups is the best way to market their products effectively. For instance, group certification has facilitated small and medium-sized producers' access to Brazil's Sustainable Agriculture Network–Rainforest Alliance certification system, enhancing their market opportunities (Pinto et al., 2014). The study by Steidle and Herrmann (2019) found that group certification opens the door for small-scale farmers to access specialised markets regulated by sustainability or other quality standards. In addition, effective implementation of Internal Control Systems (ICS) within producer organisations ensures compliance with organic standards and reduces the risk of certification fraud. This system helps maintain the integrity of the certification process and supports continuous improvement in farming practices.

3.5 Summary and research conceptual framework

The literature review chapter of this study analyses the role of producer organisations, focusing on the determinants of membership and the economic impact on smallholder farmers. The chapter is structured into four main sections, thoroughly exploring the concept and significance of producer organisations, the factors influencing membership, the economic impact of such membership, and the role these organisations play in facilitating organic certification for smallholders.

First, the chapter introduces the concept of producer organisations, which include cooperatives, associations, and unions, emphasising their vital role in collective action within agriculture. These organisations help in various economic functions such as collecting, processing, and marketing agricultural products, quality assurance programmes, capacity building, and coordination. They provide significant financial and technical services to their members, aiming to enhance their well-being by overcoming high transaction costs and market failures, particularly in developing countries. Producer organisations are seen as institutional solutions that enable farmers to achieve better income through self-organisation and collaborative efforts.

Second, the literature review explores the factors influencing membership in producer organisations. It categorises these factors into demographics, farm characteristics, marketing, and institutional factors. Demographic factors such as age, gender, education level, off-farm activity, and farming experience significantly influence farmers' decisions to join these organisations. Farm characteristics, including farm size, production volume, and farming practices, also play a crucial role. Market aspects like certification, market information, prices, and proximity to markets are critical in determining membership. Institutional factors such as access to extension services, technical support, market support, and input provision are also essential in influencing farmers' decisions to join producer organisations. Understanding these factors is crucial for developing effective strategies to encourage broader membership and maximise benefits for smallholder farmers.

Third, the chapter reviews empirical studies on the economic impact of membership in producer organisations. Membership leads to higher incomes, greater productivity, better access to credit, and reduced transaction costs. Various studies using Propensity Score Matching (PSM) methodologies and Endogenous Switching Regression (ESR) indicate significant economic benefits for members, including price stability and improved farm productivity.

Finally, the chapter highlights the role of producer organisations in facilitating organic certification for smallholders. Organic farming, which emphasises environmentally friendly and sustainable agricultural practices, faces significant barriers due to high certification costs and complex processes. Producer organisations play a pivotal role in supporting farmers by reducing these barriers through collective action, providing training and financial assistance, and establishing market linkages. Producer organisations enable smallholders to participate in high-value markets by facilitating access to group certification, thus contributing to economic and social development. Certification ensures the reliability and quality of organic products, allowing smallholders to access premium markets and receive higher prices, which leads to better income prospects and economic stability.

The conceptual framework for this study integrates findings from the literature review, focusing on how producer organisations influence the economic outcomes of smallholder farmers. The conceptual framework demonstrates how farmer demographics, farm characteristics, and institutional factors collectively influence smallholder farmers' decisions to join producer organisations. Membership in these organisations leads to higher profitability, thereby improving the economic well-being of smallholder tea farmers. The visual representation in Figure 3.1 provides a clear and comprehensive overview of these relationships and impacts.

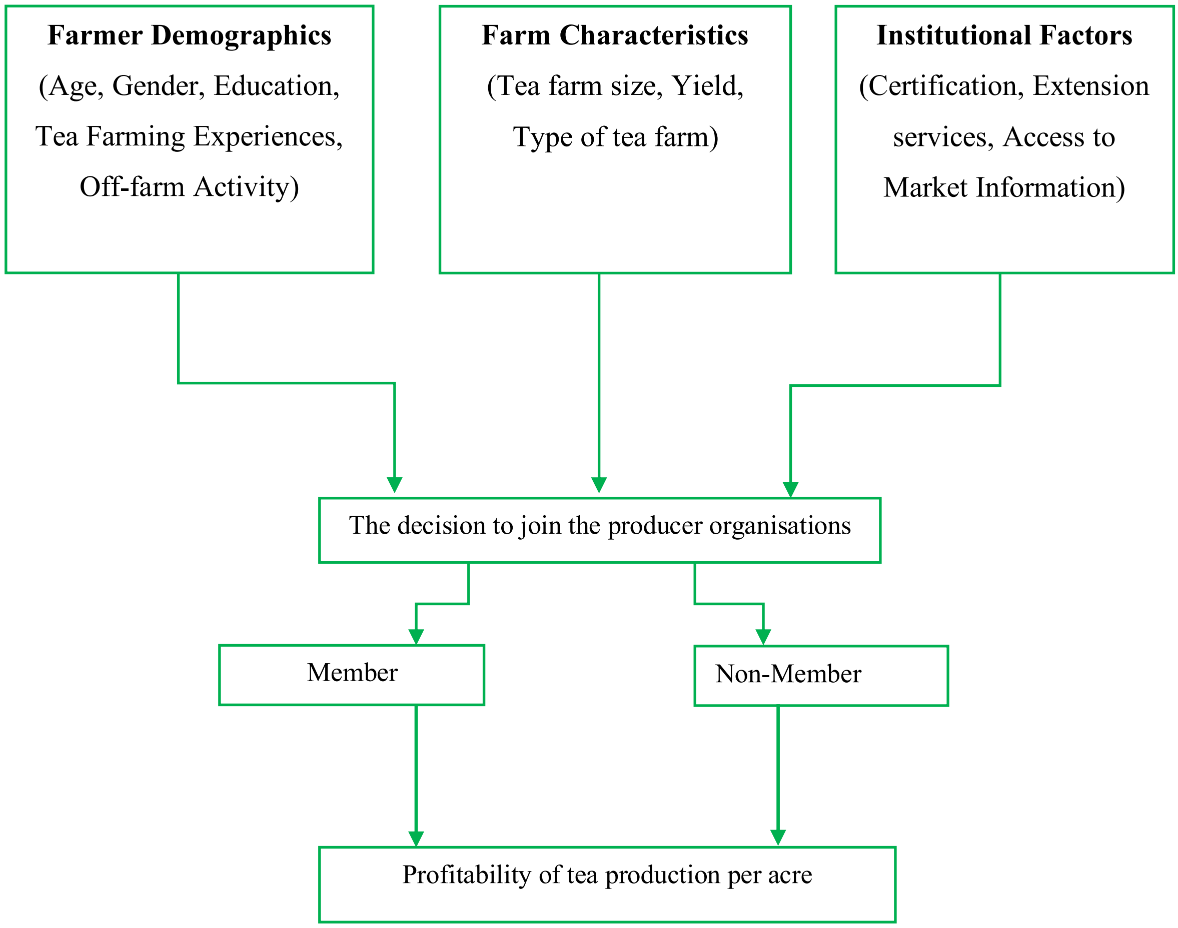


Figure 3.1: Conceptual framework

Chapter 4 : Method of Analysis

4.1 Introduction

This study aims to assess the role of producer organisations, including examining the factors influencing membership and an analysis of the economic impact of producer organisation membership. This chapter details the research methodology employed in the study. The first section outlines the research strategy used to achieve the objectives. Section 4.3 discusses the study area selection followed by Section 4.4, explaining the sampling technique for selecting participants. Sections 4.5 and 4.6 cover the design of questionnaires and data collection methods, while Section 4.7 describes the data analysis methods. Ethical considerations and research limitations are presented in sections 4.7 and 4.8, respectively. Finally, the last section provides a summary of the chapter.

4.2 Research strategy

There are three commonly used methods in conducting research: qualitative, quantitative, and mixed methods (Creswell, 2003; Migiro & Magangi, 2011). Qualitative research is exploratory, focusing on understanding various aspects of human experience, including beliefs, experiences, attitudes, behaviour, and interactions, while quantitative research is focused on measurement and producing numerical data for statistical analysis (Ismail et al., 2021; Pathak Jena & Kalra, 2013). As Creswell (2005) proposed, mixed methods research integrates both qualitative and quantitative paradigms within a single study, facilitating a more comprehensive exploration of the research problem. This approach leverages the strengths of each method to offer a deeper and more thorough analysis (Greene et al., 1989; Tashakkori and Teddlie, 1998).

Based on the research objectives and the nature of this study, a primarily quantitative research approach was applied as the main research strategy. In addition, preliminary interviews were conducted in the design phase to inform the development of the quantitative survey. In this study, the survey approach was the main strategy used to examine the factors influencing membership and analyse the economic impact of producer organisation membership. Survey research is valuable and credible, offering distinct advantages in describing and exploring variables and concepts of interest (Ponto, 2015). Key benefits of using surveys include the capacity to access a large population, leading to higher statistical power, the ability to collect extensive data, and the availability of validated models for analysis (Jones, Baxter, Khanduja, 2013).

To develop a comprehensive and relevant survey, a pre-interview through an online video face-to-face interview was conducted to gather background information from leaders of producer organisations, processing factory owners, and the Myanmar Tea Association committee members.

According to Krouwel, Jolly, and Greenfield (2019), video interviews are closely comparable to face-to-face interviews, with some suggesting they are only marginally less effective. These interviews expand the potential study population, as participants can join regardless of location, eliminating concerns about travel, distance, or safety. However, the success of video interviews relies on reliable technology, including a stable internet connection and good cameras and microphones (Saarijarvi and Bratt, 2021). This research aimed to enhance the relevance and comprehensiveness of the quantitative data collected using insights from these preliminary interviews during the survey design phase.

4.3 Study area

Tea cultivation is widespread across various regions in Myanmar, including Shan State, Chin State, Sagaing Division, Mandalay Division, Kachin State, Kayin State, Magway Division, and Rakhine Division (Lu,2021). Among these regions, the study focused on Shan State, where more than 80% of tea is cultivated in this region. According to ILO (2019), 58% of tea production takes place in the Northern Shan State, and 25% of the country's total production occurs in the Southern Shan State. The study was planned to be undertaken in both Southern and Northern Shan States, but due to the serious civil war going on in Northern Shan during the study period, only Sothern Shan will be chosen for this study. There are three main tea-producing areas in Southern Shan State: Pindaya, Ywa Ngan, and Pinlaung (ILO,2019). These areas have established tea producer groups, namely Pindaya Tea Cluster, Ywa Ngan Tea Cluster, and Pinlaung Tea Cluster.

4.3.1 Pindaya township

Pindaya Township, located in Southern Shan State, is known for its tea production and is one of the most famous tea-producing regions in the area. Besides tea, Pindaya produces coffee, ginger, various vegetables, oilseeds, and fruits like avocado, mango, and orange (Thar,2019). However, tea remains the primary export, valued for consumption and fermentation into the popular tea-leaf salad. The township comprises 28 village tracts with a total of 137 villages and a population of approximately 77,183. Tea is the major crop, with around 8,500 acres of tea plantations spread across 45 tea-growing villages. Each of the 4,000 farmers typically owns about 2 acres of tea plantations situated at an altitude of around 1,150 meters above sea level (ILO,2019). There are over 100 processing factories in Pindaya, but the largest are Maw Shan, Taung Tan Ni, and Sikya Inn. Maw Shan is the largest, processing over 1,633 kg of fresh tea leaves per day in 2018, to reach 2,400 kilograms per day in 2019 in 2018, to reach 2,400 kg per day in 2019. Maw Shan works with about 250 farmers who have organic certification.

Additionally, many tea brokers are active in this region. In Pindaya, there is a tea producer group known as the Pindaya Tea Cluster, affiliated with the Myanmar Tea Association. It is managed by six members and comprises 300 farmers, 200 of whom have EU organic certification.

4.3.2 Ywan Ngan township

Ywan Ngan Township, part of the Danu Self-Administered Zone in Southern Shan State, is renowned in Myanmar for its coffee and tea production. The township has around 10,000 acres of tea plantations across 64 villages. Farmers often intercrop tea with coffee and avocado, leaning towards organic methods due to limited access to chemical fertilisers and pesticides. Situated at 4,082 feet above sea level, Ywan Ngan has 17,653 households across 125 villages. The local farmers have more advantages, as the township is located near Mandalay, which is a tea trading hub in Myanmar. In addition, with support from GIZ, the community crowdfunded two local tea factories, which improve tea quality by processing fresh leaves on the same day they are harvested. There is also a tea producer group called the Ywan Ngan Tea Cluster under the Myanmar Tea Association, with 300 EU organic-certified members. The Paline Organic Tea Processing Company works closely with these tea producer groups, buying and supporting their organic tea products by providing production facilities, technical assistance, and input support.

4.3.3 Pinlaung township

Pinlaung Township, a relatively remote region in Southern Shan State, is the largest area of tea cultivation in the region. The township has a mixed ethnic Pa-O and Shan population. The smell of tea leaves welcomes visitors, and local shops are filled with dried or pickled tea leaves. Pinlaung has around 18,000 acres of tea plantations, with each of its 7,000 farmers typically owning 2 to 3 acres. Situated at an altitude of approximately 1,500 meters, Pinlaung enjoys a cool climate of 14-20 degrees Celsius, ideal for tea cultivation. Despite its potential for tea production, Pinlaung is relatively poor, partly due to conflict and drug-related issues from poppy cultivation. Chemical use in agriculture is very low, and most tea processing occurs at the micro level. Smallholder farmers often sun-dry tea leaves during the summer to produce green tea and sell fresh leaves to small-scale factories for fermented tea production during the rainy season. In Pinlaung Township, the Pinlaung Tea Cluster operates with 289 members under the Myanmar Tea Association. Additionally, larger companies are starting to introduce contract farming.

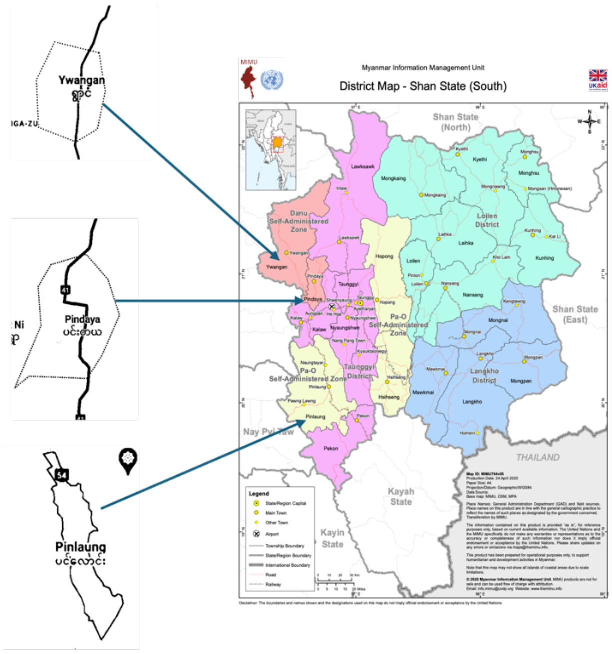


Figure 4.1: Map of southern Shan state (Myanmar Information Unit,2020)

4.4 Sampling approach and sample size

Sampling in research is crucial for efficiency and practicality, allowing researchers to study a subset of the population that represents it accurately (Taherdoost, 2016; Rai & Thapa, 2015; Acharya et al., 2013). This approach saves resources and time while enabling valid inferences about the entire population. Proper sampling techniques ensure representativeness, statistical analysis feasibility, and reduction of biases, making research outcomes reliable and insightful.

Sampling techniques are broadly categorised into two types: probability or random sampling and non-probability or non-random sampling (Taherdoost, 2016; Rai & Thapa, 2015; Acharya et al., 2013). Probability sampling ensures that every item in the population has an equal chance of being selected, offering high freedom from bias. However, achieving a low sampling error can be time and resource intensive. On the other hand, non-probability sampling is used when it's challenging or impractical to obtain a random or representative sample from the population. In this approach, not every member of the population has an equal and known chance of being selected into the sample. While non-probability sampling methods are often easier and less costly to implement, they can introduce bias and may not accurately represent the entire population, making generalising more challenging (Taherdoost, 2016; Rai & Thapa, 2015).

In this study, purposive sampling, which is one of the non-probability sampling methods, was employed. The primary aim of purposive sampling is to select participants based on specific characteristics or criteria relevant to the research study. According to Rai and Thapa (2015), in qualitative or mixed methods research, this targeted approach is not seen as a drawback but rather a deliberate choice aligned with the research objectives. While purposive sampling offers advantages like efficiency in time and cost, it comes with limitations related to data bias and challenges in generalising the sample to the broader population (Acharya et al., 2013; Palinkas et al., 2015).

The study applied the following criteria for selecting producer groups and tea farmers:

4.4.1 Quantitative sample determination

The sample size for the study was determined using the Cochran (1963) formula for unknown population size.

$$n = \left(\frac{Z\sigma}{E}\right)^2$$

Where n is the sample size, Z is the critical Z value equal to 1.6448, is the population standard deviation, E is the expected margin of error and is the confidence level.

The desired confidence level for the study is 95 percent, and a 5 percent level of precision. The variation among the tea farmers in Shann State is not known, so the study assumed a variance of 0.5. This level of maximum variability produced a more conservative sample size than the mean would calculate

$$n = \left\{\frac{(1.96)(0.5)}{0.05}\right\}^2 \qquad = 384$$

Table 4.1: Quantitative sample determination

Farmers	Pindaya Tea Cluster	Ywa Nga Tea Cluster	Pinlaung Tea Cluster	Total
Organic Tea Farmer Members - Must be a member of one of the tea producer organizations (Myanmar Tea Association, Pindaya Tea Cluster, Ywa Ngan Tea Cluster, Pinlaung Tea Cluster) - Have received any kind of support from the producer groups (Input support or technical support) - Must be an organic certified farmer and sell its tea to organic tea processing factories.	100	56	48	204
Conventional Tea Farmer Members - Must be a member of one of the tea producer organizations (Myanmar Tea Association, Pindaya Tea Cluster, Ywa Nga Tea Cluster, Pinlaung Tea Cluster) - Have received any kind of support from the producer groups (Input support or technical support) - Must be a conventional tea farmers	17	20	-	37

Non-Members Tea Farmers with Organic Certificate - Not a member of any tea producer groups - Must be an organic certified farmers and selling its tea to organic tea processing factories. - Must selling its tea products to organic buyers	12	-	-	12
Non-Member Conventional Tea Farmers - Not a member of any tea producer groups - Must be a conventional tea farmers - Must not have any organic tea certified plots	71	24	52	147
Total	**200**	**100**	**100**	**400**

4.5 Questionnaires development

Questionnaires serve as the primary tool for researchers to collect relevant data regarding the research topic (Jenn, 2006; Roopa & Rani, 2012; Taherdoost,2022). Therefore, a well-designed questionnaire plays an important role in surveys as it ensures the collection of accurate and interpretable data. According to Roopa and Rani (2012), questionnaires need to have a clear purpose aligned with research objectives, with a clear understanding from the beginning of how the findings will be utilised. There are two commonly used types of questionnaires, along with a mix of these types known as semi-structured questionnaires (Taherdoost,2022). The first type is the structured questionnaire, characterised by a clear and predetermined format with sequenced questions (Taherdoost,2022: Roopa & Rani,2012).

Conversely, unstructured questionnaires utilise open-ended and opinion-based questions, often used in focus-group interviews. These questions offer a wide range of possible answers, making them challenging to pre-code as not all responses can be easily categorised beforehand. Semi-structured questionnaires combine elements of structured and unstructured formats. They include both fixed questions with predefined responses and open-ended questions to capture diverse perspectives (Jamshed,2014; Taherdoost,2022). According to Bearman (2019), semi-structured questionnaires are commonly used in qualitative research to gain a deeper understanding of human experiences.

This study employed a dual approach, using semi-structured questionnaires for pre-interviews and structured questionnaires for quantitative surveys. This methodology was used to comprehensively investigate the role of producer organisations, including its determinants, and assess economic influence.

4.5.1 Pre-interview questionnaires

In this study, preliminary interviews were conducted using semi-structured questionnaires to explore the role and impact of tea producer organisations in the Myanmar tea industry. These pre-interviews aimed to gain a deeper understanding of how tea producer organisations operate, their relationships with farmers and stakeholders, their effectiveness in addressing industry challenges, and their role in enhancing economic efficiency for tea farmers in Myanmar. The insights gathered from these pre-interviews were crucial for developing comprehensive and relevant survey questionnaires for quantitative data collection. Open-ended questions were prepared and structured based on research objectives and the previous literature (Tray,2021; Maspaitella,2015; Thar,2016; Ahmad,2017). This allowed the researcher to revise and add some questions to both the pre-interview and the quantitative research questions before pre-testing them. The pre-interview questionnaires comprised five primary sections. Section 1 gathered participant information, including their position, education, and experience. Section 2 explored the background of producer organisations, detailing their reasons for formation, objectives, operations, and membership structure. Section 3 focused on the products and services offered by these organisations. Section 4 focused on the coordination with various stakeholders within the tea industry, while Section 5 primarily explored opportunities and challenges encountered by these organisations.

Table 4.2: Selection of key informants for pre-interview

<table>
<tr><th>Actors</th><th>Pindaya Tea Cluster</th><th>Ywan Ngan Tea Cluster</th><th>Pinlaung Tea Cluster</th><th>Total</th></tr>
<tr><td>Myanmar Tea Association
- Have a deep understanding of the organization’s operations, processes, and industry trends
- EC members of the cluster
- Have been associated with the organization for a significant period)
- Open to sharing the information</td><td colspan="3">2</td><td>2</td></tr>
<tr><td>Lead and secretary of POs
- Have a deep understanding of the organization’s operations, processes, and industry trends
- EC members of the cluster
- Have been associated with the organization for a significant period)</td><td>1</td><td>1</td><td>1</td><td>3</td></tr>
<tr><td>Smallholder Tea farmers (Member of POs)
- Member of the tea cluster
- Receive products and services from the PO
- Have been growing tea for a certain amount of time
- Selling to specialized tea processing factories</td><td>4</td><td>2</td><td>2</td><td>8</td></tr>
<tr><td colspan="4">Total</td><td>13</td></tr>
</table>

4.5.2 Survey questionnaires

In this study, structured questionnaires were developed for quantitative data collection, aiming to gather specific and relevant information necessary to meet the research objectives. The process of the quantitative questionnaire development comprised three main steps: 1) drafting the questionnaire, 2) conducting a pre-test of the questionnaire, and 3) refining the questionnaire based on the pre-test feedback. The draft questionaries were developed based on previous studies (Tray,2021; Maspaitella,2015; Rada,2018; Fernando,2021; Hidayati,2023). After drafting the questionnaires, the structured questions were prepared for conducting the pre-test. Pre-testing questionnaires are crucial for enhancing the validity and reliability of survey evidence (Ikart,2019; Reynolds, Diamantopoulos & Schlegelmilch,1993). It involves assessing how respondents interpret and answer questions, ensuring they align with the research intentions. This process helps determine if respondents understand the questions, can perform required tasks, and possess the necessary information. The draft questionaries include Household information, farm characteristics, institutional factors, and market factors. The pre-testing procedure was carried out twice.

After being translated into Myanmar, the draft of the questionnaire was pre-tested first with one Burmese student studying at Massey University. This activity resulted in constructive feedback regarding the content and layout of the questionnaire. The second pre-test was conducted with four tea farmers before the survey started. This activity included eight tea farmers who would not be part of the final research samples. Based on the farmers' responses, some adjustments to the questionnaire were made, including reducing ambiguities and using the specific wording of questions. The final questionnaire was utilised in the survey, which was conducted from February 3-23, 2024. The final questionnaire included the following sections: demographic information of farmers, farm characteristics, soil conservation and machinery used, input and labour used, marketing aspects, institutional aspects, and extension services aspects.

4.6 Data collection

The main approach in this research was to utilise primary data alongside secondary data (Figure 4.2). The detailed process of collecting data from various sources is elaborated below.

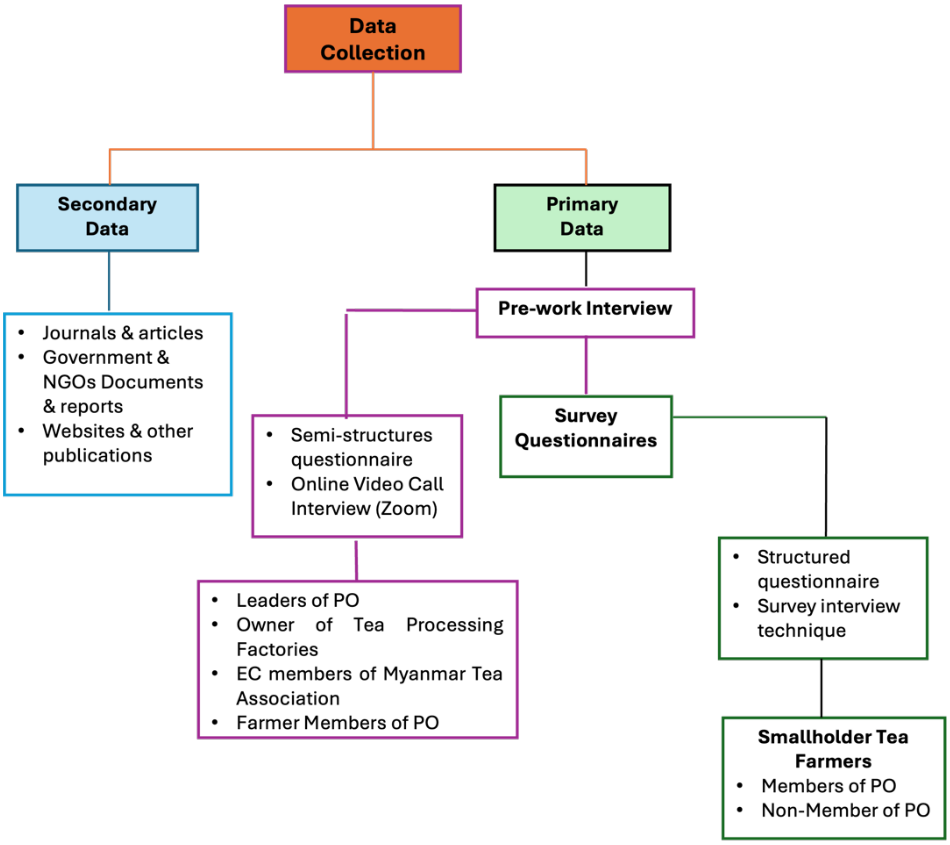


Figure 4.2: Data collection method

4.6.1 Secondary data collection

The secondary data was derived from reviewing previous research results and other available documents (Willman, 2011). It was gathered from various sources such as journals, articles, reports from NGOs, reports from the Myanmar Tea Association, websites, and other publications. The secondary data allows for historical comparisons, offering insights into long-term changes and developments. It also serves as a valuable source of background information, providing context and foundational knowledge for research projects (Kabir,2016).

4.6.2 Pre-interview data collection

The primary data collection process faced unique challenges due to the ongoing civil war in Myanmar during the time of this research, requiring innovative approaches for data collection. Conducting in-person face-to-face interviews posed a significant challenge for the researcher. To overcome this challenge, face-to-face online video interviews were used as the primary method for pre-interview data collection. This approach allowed for direct interaction with various stakeholders involved in producer organisations. Zoom software application was selected for its user-friendly interface and screen-sharing capabilities to present interviews verbatim (Saarijarvi and Bratt,2021; Gray et al.,2020).

Additionally, interviews could be recorded, allowing researchers to review them later. Qualitative interviews conducted through video, telephone, or online platforms have been validated as reliable alternatives to traditional face-to-face interviews. These methods not only reduce costs but also promote inclusivity and equality in research by facilitating participation regardless of geographical barriers (Saarijarvi and Bratt, 2021; Villiers et al.,2022; Gray et al.,2020).

4.6.3 Survey data collection

The quantitative data was collected with the structural questionnaire by using the survey CTO, a mobile data collection platform. Survey CTO is a reliable, secure, and scalable mobile data collection platform for researchers and professionals working in offline settings (Anguko,2016; Sastry et al., 2021). Survey CTO was selected for data collection in this study because of its reputation for reliability, ease of use and offline data collection capabilities. As this study involved gathering data from areas with limited internet access, Survey CTO's offline mode was crucial for ensuring uninterrupted data collection. The questionnaires were prepared with the coding in Survey CTO CAPI form based on the eight modules, which include 1) Household Information, 2) Farm Characteristics, 3) Irrigation and Soil Conservation Practices, 4) Tools and Machinery Used, 5) Input Used 6) Labor Used 7) Harvesting 8) Marketing 9) Institutional Characteristics and 10) Agricultural Extension Services. An in-person survey with a total of 408 tea farmers from Pindaya, Ywan Ngan and Pinlaung Township was conducted. According to Croome and Mager (2018), data collection with a large number of respondents often requires the assistance of a team of data collectors or enumerators. Therefore, as the sample size of the study is large, enumerators have been hired for the data collection.

4.6.4 Selection of enumerators and training for enumerators

Croome and Mager (2018) and Jalil (2013) emphasise the critical importance of effective management and training for enumerators in research projects. Failure to select, prepare, and motivate enumerators properly can significantly impact research efficiency and the quality of collected data. Therefore, a thorough process of selecting and training enumerators was employed to ensure high-quality data collection. As the survey was conducted in three different townships in Shan State, understanding the local language is essential in data collection. Therefore, enumerators were chosen based on criteria such as previous experience in data collection, familiarity with data collection applications like Kobo Tools or Survey CTO, local language proficiency, and educational qualifications.

To ensure that the enumerators were well-equipped to collect high-quality data from respondents, two days of comprehensive training were provided to the selected enumerators before the data collection. The first day of training focused on survey methodology, ethical considerations in data collection, understanding the questionnaires, and a detailed review of each module within the questionnaires. Enumerators were guided on the information required for each question and how to ask questions appropriately for each module. On the second day of training, enumerators were trained on using the Survey CTO application. They also engaged in practice sessions to become familiar with the survey instruments and to address any questions or concerns they encountered.

4.6.5 Monitoring data quality

As the Survey CTO allowed for monitoring data collection progress and identifying any discrepancies or outliers for a timely resolution**,** during the data collection, the data collected by enumerators were regularly monitored to ensure its quality and reliability. This monitoring process involves checking for any discrepancies, errors, or outliers in the collected data. During the data monitoring process, any discrepancies or outliers that may indicate issues with data quality were identified. This includes inconsistencies in responses, missing data, or unexpected patterns that require further investigation. Upon identifying discrepancies or poor-quality data, immediate follow-ups were undertaken with enumerators. This follow-up includes highlighting specific issues in the data and discussing ways to address and prevent similar issues in future data collection activities. Enumerators were provided with feedback on the identified errors and were guided on how to improve data collection practices.

In addition, the quality of each survey collected by enumerators was categorised into three categories: 'Good,' 'Okay,' and 'Poor.' Surveys categorised as 'Good' met the quality standards with minimal errors or discrepancies. Surveys categorised as 'Okay' had minor errors. Surveys categorised as 'Poor' showed significant mistakes or inconsistencies that compromised data quality. Out of the total 408 surveys collected, researchers identified that eight surveys had considerable quality issues classified as 'Poor.' These surveys were thoroughly reviewed, and after consultation with enumerators, it was determined that these surveys did not meet the required quality standards for inclusion in the analysis. As a result of the quality assessment, researchers decided to reject the 8 surveys categorised as 'Poor' due to their low quality. These surveys were excluded from the dataset used for analysis to maintain data integrity and ensure the reliability of the study findings.

4.7 Data analysis

4.7.1 Data entry and cleaning

The data analysis for this study was conducted using STATA version 18. STATA is a statistical software tool used for data analysis, modelling, and management. It offers a user-friendly interface and a wide range of statistical functions, making it popular in academic and research settings (IFPRI,2018). Initially, the dataset underwent a completeness and validity check to ensure that all required data fields were populated accurately for each observation. Logical inconsistencies were then verified and fixed to maintain data consistency. Outliers, identified through statistical measures such as means and standard deviations, were addressed by replacing them with the mean values of their respective variables to prevent biases in the analysis. Additionally, some continuous data points were transformed into categorical variables to facilitate comparative analysis. The final dataset used for analysis comprised 400 farmers, including 239 members and 161 non-members of producer organisations, with cleaned and validated data ready for statistical analysis and interpretation.

4.7.2 Statistical procedures of data analysis

Three statistical methods were employed for data analysis for this study. The choice of statistical techniques, including chi-square, t-test, and Propensity Score Matching, was based on the nature of the variables and the research objectives. The data analysis began with a comprehensive descriptive analysis using STATA. This analysis aimed to examine the characteristics of both members and non-members of producer organisations among tea farmers. Descriptive statistics such as means, standard deviations, frequencies and percentages were calculated to summarise key variables of interest, including demographics, farm characteristics, marketing aspect and institutional aspects.

Following the descriptive analysis, further analysis was conducted to explore relationships and differences between variables of interest. Chi-square tests were employed to assess associations between categorical variables, such as gender, educational level, etc. This allowed for the analysis of potential patterns or relationships within the dataset. Additionally, t-tests were used to compare means between members and non-members for continuous variables. These statistical tests were conducted to provide a deeper understanding of the impact of membership in producer organisations on economic impact.

4.7.3 Chi-square test

The chi-square test (X2) of independence is a nonparametric test that is applied to determine if two or more categorical variables have a significant relationship or are independent (Moore, Notz & Flinger,2013; Verma,2017). This test begins with a null hypothesis that assumes no significant relationship between the variables, aiming to determine if the observed frequencies differ significantly from what would be expected if the variables were independent (Verma,2017; Moore, Notz & Flinger,2013). The calculation of the chi-square statistic involves comparing observed and expected frequencies, with the resulting statistic indicating the extent of deviation and the likelihood of a meaningful association (Rana & Singhal,2015; McHugh,2013). By comparing the chi-square statistic to critical values or calculating a p-value, researchers can determine whether to reject the null hypothesis and conclude that a statistically significant relationship exists between the categorical variables being studied (Moore, Notz & Flinger,2013). Chi-square tests were employed to assess associations between categorical variables, such as gender, educational level, etc. The equation of the Chi-square test is presented in detail below:

$$x^2 = \sum_{i=1}^{K} \frac{(O_i - E_i)^2}{E_i}$$

Where X^2 represents the chi-square test statistics represent the number of categories, O_i refers to the observed frequency in each category, and E_i represents the expected frequency in each cell, which is calculated under the assumption of independence between the two categorical variables. In Pearson's chi-square test of sample independence, the degree of freedom (df) can be determined from the dimension of the contingency table used to represent the data. According to this method, df is calculated by the formula.

$$df = (R - 1)(C - 1)$$

Where:

- (df) represents the degree of freedom,
- (r) is the number of rows in the contingency table,
- (c) is the number of columns in the contingency table.

4.7.4 Independent sample T-test

The independent samples t-test, also called unpaired t-test, is an inferential statistical test that is used to compare the means of two independent groups. It is commonly applied to determine if there's a statistically significant difference between the average means or two distinct groups (Mishra et al.,2019; Pandis,2015). As a parametric test, the independent samples t-test is suited for continuous variables (George et al., 2004; Mishra et al., 2019). In this study, two-sample t-tests using groups were used to compare means between members and non-members for continuous variables. The formula used for this two-sample t-test using groups is as follows:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{{S_1}^2}{n_1} + \frac{{S_2}^2}{n_2}}}$$

In this formula, t represents the t-statistic for the two-sample t-test. $\boxed{\overline{X_1}}$ and $\boxed{\overline{X_2}}$ are the sample means of members and non-members, respectively, while S_1 and S_2 are the sample standard deviations of members and non-members. n_1 and n_2 are the sample sizes of members and non-members, respectively. To determine whether the mean difference between two independent variables is statistically significant, George et al. (2004) recommend examining the significance level (two-tailed) in the t-test, with a threshold typically set at ≤0.05.

4.7.5 Propensity Score Matching (PSM)

The objectives of this study are to analyse the factors influencing membership in producer organisations and the economic impact of such membership on profit per acre for tea farmers. To achieve these objectives, Propensity Score Matching (PSM) was applied due to its effectiveness in minimising selection bias.

As the objective of the study is to estimate the impacts of producer organisation membership on profit per acre for tea farmers, it is challenging to observe the outcomes for members if they were not members. Therefore, a counterfactual group or a control group of tea farmers who are not members is needed. However, members and non-members differ in several observable characteristics, such as age, gender, education and farm size. Therefore, a simple comparison of these two groups will produce biased estimates (Caliendo and Kopeinig,2008; Fernando,2021). Propensity Score Matching (PSM) is the commonly used method to overcome this selection bias (Chagwiza et al.,2016; Dagne Mojo, Mojo et al.,2017; Ahado et al.,2021). According to Caliendo and Kopeinig (2008), Propensity Score Matching is applicable in scenarios where there is a treatment group consisting of individuals who receive treatment, and a control group comprised of individuals who do not receive treatment. It involves matching treatment and control units that have similar values on the propensity score, along with potentially other covariates. (Rosenbaum and Rubin,1983; Rubin,2001; Caliendo and Kopeinig,2008). These scores are calculated using a logistic or probit regression model that predicts the likelihood of an individual receiving the treatment based on their observed characteristics (Caliendo and Kopeinig,2008; Thavaneswaran,2008).

The propensity score matching (PSM) method was employed in this study due to its recognised advantages and widespread use in agribusiness research. PSM offers several benefits, including reduced selection bias by balancing treatment and control groups based on observed characteristics, thus minimising the influence of confounding variables (Austin,2011; Thavaneswaran,2008). Moreover, PSM is adaptable to various research designs and data types, making it suitable for diverse agribusiness studies ranging from assessing the impact of membership on economic performance (Gurung et al., 2023; Mojo et al.,2017) to analysing financial performance for rice farmers (Rada,2018; Fernando,2021), and assessing the impact of agricultural cooperative membership on potato production and technical efficiency (Ahado et al.,2021).

4.7.6 Implementation of Propensity Score Matching Model (PSM)

To control the selection bias that may exist between the members and non-members of the producer organisation, the propensity score matching (PSM) proposed by Rosenbaum and Rubin (1983) was applied in this study. The first step in PSM involves estimating the propensity score, which predicts the probability of a farmer's decision to join the producer organisation. According to Caliendo and Kopeinig (2008), two crucial choices must be made during the propensity score estimation process. The first choice is to select the appropriate model for estimation, while the second choice involves determining which variables should be included in this model. In the binary treatment, both logit and probit models can be used to estimate the propensity scores. The choice of the model is not crucial as they both can produce similar results (Caliendo and Kopeinig,2008). Therefore, the probit model is applied in this study to estimate the propensity scores. The equation of the probit model is written below.

$$pr(X_i) = P\ (Z = 1|X_i)$$

Where $pr(X_i)$ is the propensity score of the i_{th} individual; $P\ (Z = 1|X_i)$is the probability of treatment given the observable covariates (X) of the i_{th} individual. The propensity scores are then used to construct a control group by matching members of the producer organisation and non-members.

In terms of choosing variables to be included in the model, it is suggested to include only covariates in the propensity score model that are relevant to both the participation decision and the outcome variable. Variables should be chosen based on economic theory, previous research, and institutional knowledge (Sianesi,2004; Smith and Todd,2005). It's crucial to ensure these variables are unaffected by participation or anticipation of it, either by measuring them before participation or ensuring they remain constant over time. The first objective of analysing the factors influencing membership was achieved by estimating propensity scores using the probit model. Members and non-members were then matched based on these scores, allowing for an unbiased comparison of the factors influencing membership.

Secondly, to ensure the reliability of the propensity score matching estimates, two different alternative matching techniques were checked: Nearest Neighbor Matching (NNM) and Radius Matching (CM). Nearest Neighbor Matching (NNM) involves pairing each treated unit with the closest untreated unit based on the propensity score, ensuring a direct comparison between similar units (Austin, 2013). Radius Matching (CM), on the one hand, pairs each treated unit with all untreated units within a specified range of propensity scores, providing a balance between precision and robustness by including multiple nearby matches (Caliendo & Kopeinig, 2005). According to Caliendo and Kopeinig (2008), numerous matching algorithms can be employed in

PSM, each with trade-offs between bias and efficiency. The selection of a matching method should consider factors such as sample size, the available number of treated/control observations, and the distribution of the estimated propensity score (Caliendo & Kopeinig, 2008; Guo & Fraser, 2014). By employing multiple matching algorithms, this study aimed to thoroughly explore different matching techniques and assess their effectiveness in achieving a balance between treated and control groups. This comprehensive approach allowed for a comparative analysis of outcomes and facilitated the identification of the most suitable matching algorithm for robust estimation of treatment effects while minimising bias.

Thirdly, common support conditions were checked to ensure sufficient overlap in the propensity score distribution between the treatment and comparison groups. As advised by Dehejia and Wahba (1999), it's crucial to avoid comparing the incomparable; only the subset of the comparison group that is comparable to the treatment group should be used in the analysis. Therefore, assessing overlap and the common support region between these groups is a critical step. Various methods can be used to check density distribution, with visual analysis of the propensity score density in both groups being the most straightforward approach (Caliendo & Kopeinig, 2008). Additionally, a balancing test was conducted to confirm the elimination of differences in covariates between the two groups in the matched sample. Ali & Abdulai (2010) recommend this test as a common requirement for ensuring matching quality, using the mean absolute standardised bias (MASB), which should be less than 20%, to confirm successful matching (Rosenbaum & Rubin, 1985). Furthermore, Sianesi (2004) suggested that a lower pseudo-R2 after matching and a rejected log-likelihood ratio test indicate successful matching. These indicators help assess the distance in the marginal distribution of independent variables and confirm the balance achieved between the treatment and comparison groups.

Finally, after matching the members with similar non-members, the average treatment effects on treated (ATT) are computed. The matches should be restricted to households with propensity scores that fall in the area of common support. Propensity scores that fall out of this region are dropped from the sample on which matching is executed. Members of the producer organisation who have an appropriate match cannot be found and non-members not used as matches are dropped from the further analysis. The average impact of membership on the performance of the members, known as the average treatment effect on the treatment (ATT), is estimated as follows:

$$\boxed{ATT = E(Y_i^1 - Y_i^0)}$$

Where ATT is the average treatment effects on the treated; E(Yi) is the expected value of the impact indicator; 1 present the treatment, 0 otherwise. A positive (negative) value of ATT indicates that members have higher (lower) outcome variable Y (here, net profit) than non-members.

4.7.7 Explanatory, treatment, and control variables

The detailed definitions and descriptive statistics of each variable can be seen in Table 4.3. The variables used in this study can be categorised into output, treatment, and control variables. The treatment variable is binary, representing FPO membership, with a value of 1 for members and 0 for non-members of producer organisations. The outcome variable is the profit per acre of tea farming, which quantifies the difference between total tea income and production costs, measured in Myanmar Kyat per acre. Production costs include fixed costs (machinery and pruning tools) and variable costs (seedlings, EM Bokashi, compost, Gypsum, Urea, T-super, Compound, pesticides, herbicides, and labour for land preparation, planting, pruning, weeding, plucking, and grading).

In this study, 10 key variables were selected for further analysis using probit regression and propensity score matching (PSM) to assess membership in producer organisations and its impact on profitability. Variables were chosen based on their relevance to membership decisions, including age, gender, and education, as these affect access to information and decision-making (Bernard & Spielman, 2009). Tea farming experience, farm size, and yield per acre capture farming capacity, while certification, market information, and extension services reflect institutional support (Fischer & Qaim, 2012; Hellin et al., 2009). The selection of these variables is supported by studies that link socio-economic factors, certification, and market access to organisational membership (Gurung et al., 2023; Ahado et al., 2021; Mojo et al., 2017; Bernard & Spielman, 2009; Rueda & Lambin, 2013).

Table4.3: Descriptive statistics and definition of variables

Variables	Definition	Unit	Mean	SD
Output Variables				
Profit Per Acre	Total Tea income minus total production cost (MMK/acre)	MMK/Acre	1,409,303	1,185,837
Treatment Variable				
Membership	1= Member 0= Non-member	Dummy	0.59	0.49
Control Variables				
Age	Age of household head (years)	Years	46.123	12.291
Gender	Gender of HH head (0=Female 1=Male)	Dummy	0.437	0.496
Education	Education Level of household head	Education Level	2.777	1.086
Tea farming experiences	Number of years involved in tea farming	Years	25.387	11.829
Off-farm activity	Off-farm employment (1= Yes 0= No)	Dummy	0.505	0.500
Tea Farm Size	Total acreage of tea farm size (acres)	Acres	3.267	2.309
Tea production volume	Total tea production volume per acre (kg/acre)	Kg/Acre	4235.674	2863.764
Certification	Organic certification for tea farm (1=Yes 0=No)	Dummy	0.5	0.500
Market information	Access to market information (1=Yes 0=No)	Dummy	0.433	0.496
Extension services	Access to extension services (1=Yes 0=No)	Dummy	0.323	0.468

4.8 Ethical consideration

This study involved a diverse group of participants, including tea farmers (both member and non-member producer organisations), tea processing factory owners, and leaders of producer organisations. The research strictly adhered to the ethical guidelines set forth by the Massey University Human Ethics Committee (MUHEC) to ensure the fair treatment and protection of all participants. Before the interviews, participants were provided with clear and detailed information about the study's objectives and potential benefits. It was emphasised that their participation was entirely voluntary, and they were informed of their right to decline to answer any questions they found sensitive or uncomfortable. Enumerators, who were specially trained for this research, ensured that participants were fully briefed on the study's purpose and scope before proceeding with the survey. Informed consent was obtained from each participant before their inclusion in the study, and only those who provided explicit consent were involved. Confidentiality was of utmost importance throughout the research process. Participants were assured that their personal information and responses would remain strictly confidential and be used solely for research purposes. To formalise their participation, they were required to sign a consent form, thereby providing both oral and written consent.

4.9 Limitations of the research

According to the research design and methods, various limitations could be identified.

- The scope of this study was restricted to a small sample size, covering only three out of the 18 tea clusters. Due to resource constraints, the study was unable to include all tea producer groups. Moreover, the major tea-growing area of Northern Shan was not included in the research due to the ongoing civil war during the study period. This omission may have resulted in an incomplete representation of the broader tea production landscape.
- Enumerators were employed to assist with data collection. Although they received training before the survey, the duration of the training was limited to only two days due to time and budget constraints. This abbreviated training period may not have been sufficient to fully equip the enumerators with the skills necessary to conduct the survey effectively, potentially leading to inconsistencies or inaccuracies in the data collected.
- While efforts were made to closely monitor and check the data as soon as the enumerators submitted it, logistical challenges such as time differences and internet connectivity issues led to delays in follow-up. These delays may have impacted the ability to address data quality issues promptly.
- The study did not involve government actors, who are crucial stakeholders in the tea production sector. This exclusion was due to the political conflict and the risk of social punishment associated with engaging with the government. The absence of government perspectives may have limited the study's ability to fully capture the regulatory and policy environment affecting tea production.
- The analysis of the collected data was conducted within the constraints of the available resources, which may have limited the depth and scope of the study. The findings should, therefore, be interpreted with caution, considering the potential for biases or gaps in the data.

Chapter 5 : Insights and Sample Descriptive Analysis Results

5.1 Introduction

This chapter provides a comprehensive analysis of the Myanmar Tea Association (MTA) , based on insights from pre-interviews with key stakeholders and descriptive survey data from 400 smallholder tea growers across three townships: Pindaya, Pinlaung, and Ywan Ngan in Southern Shan State, Myanmar. The main objective of this research is to examine the role of tea-producer organisations. While the MTA refers to these groups as tea clusters in its organisational structure, this study considers these tea clusters as producer organisations, as they function similarly by representing the collective interests of tea farmers and other stakeholders in the value chain. In this study, tea clusters are considered tea producer organisations to evaluate the factors influencing membership decisions and their impact on the profitability of smallholders.

The pre-interviews were conducted to explore the role, structure, and challenges faced by these tea producer organisations within the Myanmar tea industry. This study aims to gain a deeper understanding of their operations, relationships with farmers, and their effectiveness in addressing industry challenges. The descriptive analysis divides the sample into two groups: smallholder tea farmers who are members of these producer organisations (tea clusters) and non-members.

The insights from the pre-interviews help to contextualise the quantitative findings, providing a richer understanding of the study's results. Descriptive statistics, including frequencies, percentages, maximums, minimums, and means, were used to characterise the sample. Comparative analyses were also conducted to assess significant differences between members and non-members, using the Chi-square test for categorical variables and the t-test for continuous variables. This descriptive analysis lays the foundation for the following chapters.

This chapter is divided into five sections. After this introduction, Section 5.2 presents the pre-interview results, focusing on the background, products, services, and challenges of the Myanmar Tea Association and tea producer organisations (tea clusters). Section 5.3 provides a detailed analysis of the descriptive results, including the demographic characteristics, farm characteristics, market access, and institutional support received by both members and non-members. Section 5.4 discusses the profitability estimation of tea production per acre, and Section 5.5 summarises the results of the descriptive analysis.

5.2 Pre-interview result

5.2.1 Organisational background of Myanmar Tea Association

The Myanmar Tea Producers and Exporters Association, commonly known as the Myanmar Tea Association (MTA), is an organisation that brings together various stakeholders within the tea value chain, including tea growers, processors, traders, and exporters. Supported by the Myanmar Fruit Flower Vegetable Producer and Exporters Association (MFVP), the MTA was established in 2013. Initially formed as a tea cluster with 15 working group members, it has since evolved into an association representing the majority of tea producers in Myanmar, though there are still non-members who do not receive the services and inputs provided by the MTA

Today, the MTA serves as the central organisation for all tea clusters, also referred to as producer groups or producer organisations, with over 20,000 members—approximately 70% of whom are tea farmers. The association's primary goal is to support farmers in improving tea quality to meet international standards. This is achieved by providing agricultural technologies, promoting food safety and hygiene practices, and creating opportunities for access to global markets.

As the president of the MTA stated, *"We aim to establish a systematic approach to tea production that emphasises quality and safety standards. We are focusing on enhancing our production practices to improve efficiency and consistency. By ensuring that all tea produced meets high-quality and safety standards, we can secure better prices both locally and internationally. Additionally, we aim to create premium tea products that meet the needs of high-value market segments. This approach will help our tea farmers by increasing their profitability and competitiveness".*

5.2.2 Structure of tea clusters/producer organisations under the MTA

The Myanmar Tea Association (MTA) organises tea producers into 18 tea clusters, based on geographic regions and market zones (see Figure 5.1). Under the MTA's structure, the term tea clusters refer to regional groups of tea farmers who collaborate within specific geographic areas. While the MTA refers to these groups as tea clusters, in this study, they are referred to as tea producer organisations. These groups play a crucial role in the tea industry by facilitating coordination and collective action to support smallholder tea farmers. The MTA acts as the central body responsible for coordinating and supervising these tea cluster groups. It provides strategic guidance, funding, resources, and services, which are then delivered to the tea cluster groups. The cluster groups, in turn, distribute these resources to their farmer members. The MTA's role is to ensure that these clusters receive the necessary input support, technical training, and market access opportunities, while the cluster groups manage the on-the-ground implementation of these services for farmers.

As the president of the MTA explained: "*We have organised tea clusters to meet the specific needs of each tea-growing area. This approach enables us to allocate resources more effectively, encourage farmers to engage in collective actions, and make our efforts more targeted and efficient for the overall growth of the tea sector*". Each tea cluster has an elected Executive Committee (EC) composed of farmer representatives. The MTA trains the EC members, who then return to their respective regions to share this knowledge with their cluster members. The number of EC members in each cluster varies based on the size of the tea-growing area, ranging from two to four members.

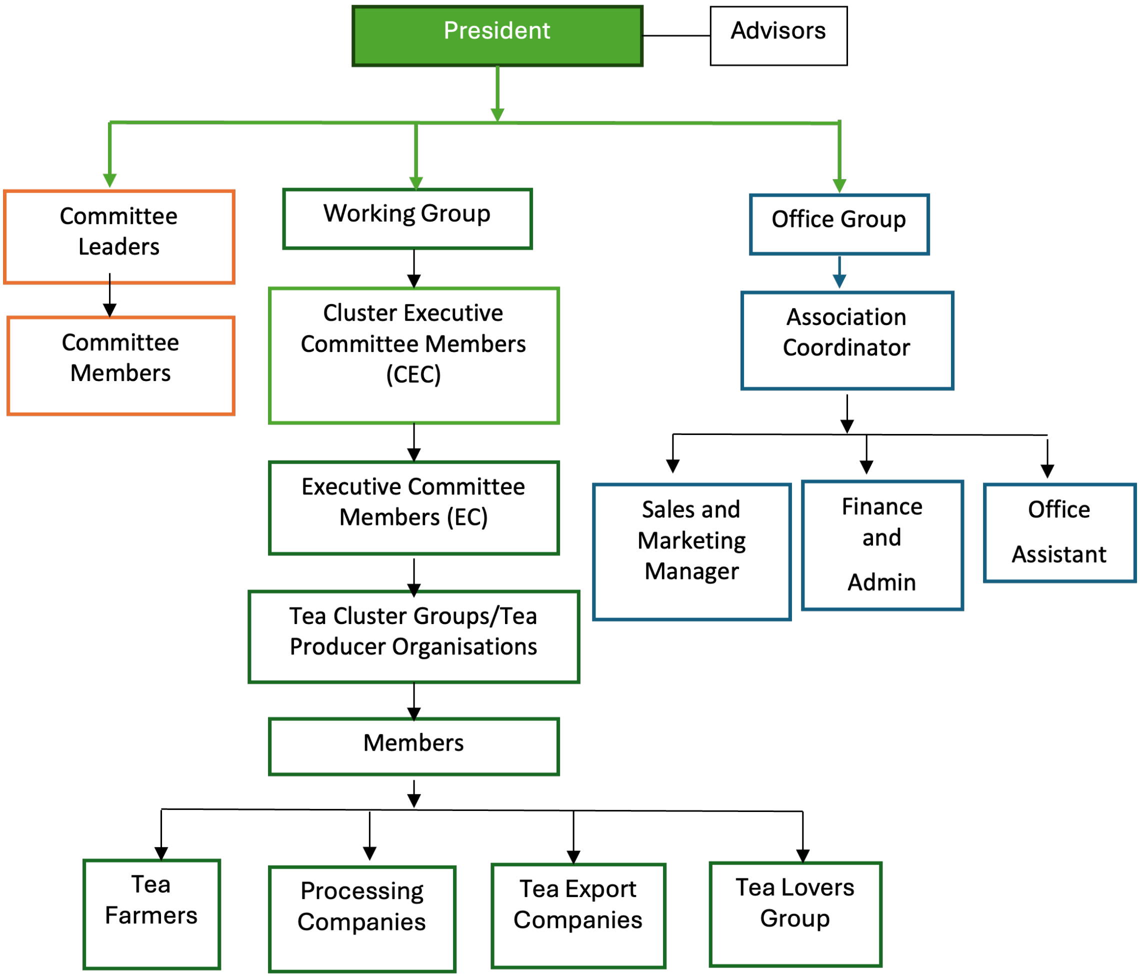


Figure 5.1: Organisational structure of Myanmar Tea Association

Source: Myanmar Tea Association (n.d)

5.2.3 Membership structure of MTA and tea clusters/producer organisations

Membership in the MTA is open to individuals involved in tea cultivation and other actors in the tea value chain, such as processors, traders, and exporters. Importantly, tea farmers who join a tea cluster (producer organisation) are also considered members of the MTA, as these clusters operate directly under the MTA’s organisational structure. In other words, by becoming a member of a tea cluster, a farmer automatically gains membership in the MTA.

Members of both the tea clusters and the MTA are required to pay an initiation fee upon joining, followed by an annual membership fee. The fees vary based on the type of member: tea farmers pay 5,000 MMK, producers pay 10,000 MMK, and companies pay 50,000 MMK. This structure ensures that all members, regardless of whether they are farmers, producers, or traders, are part of the MTA’s network, benefiting from the services and support it provides through the tea clusters.

5.2.4 Non-member tea farmers

While the majority of tea farmers in Myanmar are organised into tea clusters under the Myanmar Tea Association (MTA), a significant number remain non-members. These farmers do not receive the same level of input support, technical assistance, or market access. Pre-interviews revealed several reasons why some farmers choose not to join producer organisations, despite the potential benefits, including transitioning to organic farming and obtaining organic certification.

Common barriers include financial constraints, where even modest membership fees are unaffordable for smallholders, and geographical isolation, with some farmers located too far from cluster zones to easily access services. Additionally, many farmers in Southern Shan State practice intercropping with crops like avocados and vegetables, which require chemical fertilisers. This practice hinders their ability to transition to organic farming and obtain certification.

Other factors include the minimal price difference between conventional and organic tea leaves (only 200 kyats per kg), limited domestic demand for organic tea, and logistical challenges in transporting tea to processing factories within 24 hours of harvest. As one farmer explained, “The factory is so far away, we can’t always get the leaves there on time.” Finally, a historical mistrust of formal organisations—stemming from the state's past control over cooperatives—continues to discourage some farmers from joining, despite the potential benefits.

As a result, non-member farmers are often more isolated and have less access to vital resources such as agricultural training, input support, and market linkages, which can impact their productivity and profitability.

5.2.5 Products and services of Myanmar Tea Association (MTA) and tea clusters (producer organisations)

The Myanmar Tea Association (MTA) plays a crucial role in the Myanmar tea industry by facilitating coordination both within tea clusters (producer organisations) and between various stakeholders in the value chain. These tea clusters act as the local producer organisations that implement MTA's services on the ground, directly engaging with tea farmers. While the MTA provides the strategic direction, funding, and resources, the tea clusters are responsible for delivering these services to farmers and coordinating activities within their regions.

The MTA collaborates with International Non-Governmental Organisations (INGOs) to secure resources, which are distributed to cluster members—tea farmers, traders, processors, and exporters—through the tea clusters. Tea clusters, as producer organisations, are responsible for distributing input supplies provided by the MTA, such as seedlings, pruning tools, organic fertilisers, pesticides, and processing machines. These clusters also deliver technical training to farmers on behalf of the MTA, covering areas like cultivation techniques, pest management, pruning and plucking practices, and quality control. This decentralised approach ensures that services are tailored to the specific needs of each tea-growing region, with the tea clusters facilitating efficient delivery of resources and support to farmers.

In addition to input and technical support, the tea clusters play a critical role in connecting farmers with markets. While the MTA establishes broader market linkages and organises trade fairs and exhibitions, the tea clusters help their member farmers directly access these opportunities. For example, clusters assist farmers in promoting their products at the MTA showroom or online platforms created by the MTA. Certification support is also channelled through the clusters, with INGO collaboration, to help farmers achieve organic certification, essential for accessing premium markets.

For trader, processor, and exporter companies, the MTA provides input support such as processing machines, and technical training in quality control, Hazard Analysis and Critical Control Points (HACCP), and speciality tea production. The tea clusters facilitate these connections between local farmers and these companies, enabling closer collaboration within the tea value chain. The clusters help traders and processors access high-quality, certified organic tea from their member farmers, thereby creating stronger linkages between producers and markets.

Finally, the MTA, in collaboration with tea clusters, organises participation in global events such as international tea expos and fair-trade initiatives. These events provide valuable exposure for Myanmar tea products, allowing cluster members to stay informed about global market trends and innovations. By working together, the MTA and tea clusters help their members establish connections with international buyers, promoting growth and expansion in the global tea market.

5.2.6 Challenges of the Myanmar Tea Association

However, as a voluntary organisation, the Myanmar Tea Association (MTA) faces several significant challenges that hinder its operations and effectiveness.

Limited Resources- One of the primary challenges is the limitation of resources. The MTA operates with constrained financial and human resources, which impacts its ability to deliver services and support to its members effectively. The President of the MTA stated, *"Our financial and human resource constraints limit our capacity to provide comprehensive support to our members. We need to find sustainable ways to expand our resources."*

Reliance on Donor Support- The MTA heavily relies on donor support to sustain its operations and initiatives. While donor funding can provide essential financial aid, it also introduces a degree of uncertainty and instability. The dependence on external donors can make it challenging to plan long-term projects and can result in interruptions if the funding is reduced or withdrawn. This reliance also means that the MTA must continuously seek new donors and funding opportunities.

Availability of Committee Members- The availability of committee members is often limited, affecting the MTA's decision-making and operational capabilities. Since many committee members have their own farming or business responsibilities, their availability to participate in association activities can be sporadic. This can lead to delays in decision-making processes and the execution of planned activities.

5.2.7 Future strategies of the Myanmar Tea Association

The Myanmar Tea Association (MTA) has outlined a comprehensive plan to enhance the quality and competitiveness of Myanmar tea on the global market. These future initiatives aim to ensure consistent quality, promote sustainability, and produce Specialty tea products that can compete internationally.

Developing Tea Demonstration Farms and Processing Factories- To achieve high-quality production and maintain consistent standards, the MTA plans to build tea demonstration farms and tea demonstration processing factories. These facilities will serve as model operations showcasing best practices in tea cultivation and processing.

Focus on Sustainability and Organic Production- According to the MTA President, one of the significant advantages of Myanmar tea is its no-chemical use in production, enabling the production of organic tea products. Building on this strength, the MTA plans to focus on sustainability by promoting organic farming practices and encouraging the production of

Specialty teas. This approach supports environmental conservation and meets the growing global demand for organic and sustainably produced teas.

Producing Specialty Teas- The MTA recognises the importance of Specialty teas in capturing premium market segments. The association's president highlighted that they have gained valuable insights from a recent visit to Nepal, where they received training in Specialty tea production. The MTA plans to produce a comprehensive guideline book based on this training, which will be distributed to tea growers to standardise and improve Specialty tea production across Myanmar. The aim is to showcase Myanmar's Specialty teas at upcoming global events, such as the World Tea Expo, thereby positioning Myanmar as a key player in the Specialty tea market.

Increasing Yield with High-Yield Varieties- To further boost production, the MTA plans to introduce high-yield tea varieties that can accommodate 8,000 to 10,000 plants per acre. This initiative is expected to significantly increase the productivity and profitability of tea farms, enabling farmers to meet both local and international demand more effectively.

5.3 Descriptive analysis result

5.3.1 Demographics of the respondents

Table 5.1 presents a detailed overview of respondent demographics, including gender, age, education level, township, tea farming experience, household members involved in tea farming, and off-farm employment. Overall, there are 161 non-members and 239 members of producer organisations out of a total of 400 tea farmers.

Significant differences were found in township and education level. Membership rates vary notably by township, with Pindaya showing an almost equal split between members (48.95%) and non-members (51.55%). In Pinlaung, non-members dominate, while Ywan Ngan has a larger proportion of members. Respondents from the pre-interview mentioned that "well-functioning and active organisations that provide marketing support, input supplies, and training are more likely to attract members," highlighting how the effectiveness of these organisations influences membership decisions across regions. Education also shows a strong link to membership, with 21.76% of members having completed high school compared to 9.94% of non-members. Respondents from pre-interview noted that "educated farmers are more aware of the long-term benefits," suggesting that higher education encourages participation.

Though some variables are not statistically significant, they reveal interesting trends. Male farmers are more likely to join producer organisations, with 47.70% of males being members compared to 37.89% of non-members. Similarly, members appear to have slightly more family members engaged in tea farming. Additionally, members have slightly less tea farming experience on average (27.05 years) compared to non-members (28.02 years), indicating that farmers with less experience tend to join producer organisations more. However, this difference is not statistically significant.

Minimal differences were observed for some variables between the two groups. Off-farm activity shows a near-even split, with 51.88% of members and 48.45% of non-members participating. This suggests no clear relationship between off-farm activity and membership. Age distribution is similarly comparable, with most farmers aged between 35 and 55 in both groups. In terms of off-farm income, there is not much difference, with non-members earning 4,550,641 MMK compared to 4,319,516 MMK for members.

Table 5.1 Farmer demographic descriptive results

		Members		Non-Members			
Categorical Variables		**Obs**	**Percent (%)***	**Obs**	**Percent (%)***	**Chi-square**	**P-value**
Gender	Female	125	52.30	100	62.11	3.762	0.052*
	Male	114	47.70	61	37.89		
Township	Pindaya	117	48.95	83	51.55		
	Pinlaung	47	19.67	53	32.92	16.559	0.000***
	Ywan Ngan	75	31.38	25	15.53		
Education Level	No Formal Education	9	3.77	16	9.94	16.899	0.005***
	Primary School	97	40.59	81	50.31		
	Secondary School	59	24.69	35	21.74		
	High School	52	21.76	16	9.94		
	Bachelor’s Degree	21	8.79	13	8.07		
	Master’s Degree	1	0.42	0	0.00		
Off-Farm Activity	Yes	124	51.88	78	48.45	0.454	0.500
Age group	15-35 years	51	21.34	34	21.12	1.535	0.674
	35-55 years	129	53.97	85	52.80		
	55-75 years	59	24.69	41	25.47		
	75-95 years	0	0.00	1	0.62		

Note: *p < 0.1, ** p < 0.05, *** p < 0.01

5.3.2 Farm characteristics of respondents

This section examines the similarities and differences in tea farming characteristics such as farm size, production volume per acre, and harvesting frequency per year between members and non-members of producer organisations. As shown in Table 5.2, significant differences are observed in farming practices. A large majority of members (84.52%) engage in organic farming, compared to only 8.70% of non-members, while conventional farming is more prevalent among non-members (91.30%) than members (15.48%). This suggests that membership promotes organic farming, likely due to benefits like certification and better market access. One respondent mentioned, "*Being part of the organisation helps us get certified and sell at a better price."* Similarly, the use of cover crops is more common among members (52.72%) compared to non-members (32.92%), indicating better soil management practices. As one member explained, "*We learned about cover crops through the organisation's training, which helps maintain soil health*." The use of machinery is also significantly higher among members (37.24%) than non-members (22.98%), suggesting that membership facilitates access to farming equipment or support for its usage. One farmer noted, "Without the group's help, we wouldn't have been able to afford machinery, which has made our work more efficient."

Although not statistically significant, some variables show higher percentages or means among members. Members have a slightly higher tea production per acre (4,324 kg) compared to non-members (4,105 kg), which may point to more efficient farming practices, even though the difference is not significant ($p = 0.4423$). Farm size is almost identical between the groups, with members averaging 3.26 acres and non-members 3.27 acres, suggesting that farm size does not play a significant role in the decision to join producer organisations. Harvesting frequency also shows no notable difference, with both groups harvesting tea about 18 times yearly.

Minimal differences are observed in the practice of pruning, with 98.74% of members and 96.27% of non-members engaging in this crucial farming technique. The lack of significant difference ($p = 0.102$) shows that both groups universally accepted and practised pruning, regardless of membership status.

Table 5.2 Farm characteristics descriptive results

Continuous Variables	Membership	Obs	Mean	T-test	P-value
Tea Farm Size (Acre)	Members	239	3.26	1.691	0.974
	Non-Members	161	3.27		
Total tea production volume per acre (kg)	Members	239	4324	-0.769	0.442
	Non-Members	161	4105		
Tea Harvesting Frequency per year	Members	239	18	-	0.956
	Non-Members	161	18	0.0576	

		Members		Non-Members			
Categorical Variables		Obs	Percent (%) *	Obs	Percent (%) *	Chi-square	P-value
Type of tea farm	Organic	202	84.52	14	8.70	222.646	0.000***
	Conventional	37	15.48	147	91.30		
Cover Crop Used	Yes	126	52.72	53	32.92	15.254	0.000***
Machinery Used	Yes	89	37.24	37	22.98	9.062	0.003***
Pruning	Yes	236	98.74	155	96.27	0.102	0.102

Note: *p < 0.1, ** p < 0.05, *** p < 0.01

5.3.3 Marketing aspects

Table 5.3 highlights key marketing differences between members and non-members of producer organisations, focusing on certification rates, access to market information, tea product prices, and tea income. There are significant differences in certification rates, with 81.17% of members certified compared to only 3.73% of non-members. This disparity is due to the collective certification processes facilitated by producer organisations, making organic certification more accessible to members. As one respondent stated, "*Without the group, we wouldn't have been able to get certified for organic farming*." Additionally, members have significantly better access to market information (55.23%) than non-members (25.47%). Producers play a vital role in providing information that allows members to make informed decisions and access better market opportunities. A member explained, "The organisation helps us stay informed about market trends and prices, which is something we didn't have before."

Regarding tea product prices, no statistically significant differences were found between members and non-members. However, members tend to receive higher prices for fresh tea leaves, green tea, and dried tea compared to non-members. For instance, members receive an average of 1,398

MMK per kilogram for fresh tea leaves, while non-members receive 1,373 MMK per kilogram. Similarly, members receive higher prices for green tea (8,602 MMK per kilogram compared to 7,853 MMK per kilogram for non-members), with this difference approaching statistical significance (p = 0.0613). This trend is likely due to organic processing factories, which primarily purchase from member farmers. As one farmer noted, "*We get better prices because we're selling organic products directly to organic processing factories who are also members of the producer organisations* ." However, non-members receive slightly higher prices for pickle tea leaves (2,258 MMK per kilogram for non-members versus 1,951 MMK per kilogram for members), though the difference is not significant. In addition, regarding tea income per acre, while not statistically significant, members earn a higher average income (1,764,211 MMK per Acre) compared to non-members (1,532,604 MMK per Acre), possibly due to better prices and more efficient farming practices. One member mentioned, "*Being part of the organisation not only helps with better prices but also improves our yields through the support we receive*."

Table 5.3 Marketing

		Members		**Non-Members**			
Categorical Variables		Obs	Percent %	Obs	Percent %	**Chi-square**	**P-value**
Certification	Yes	194	81.17	6	3.73	230.785	0.000***
Access to market information	Yes	132	55.23	41	25.47	34.721	0.000***

	Members		**Non-Members**			
Continuous Variables	Obs	Mean	Obs	Mean	**T-test**	**P-value**
Fresh Tea Leaves (MMK/Kg)	170	1398	81	1373	-0.660	0.551
Green Tea (MMK/Kg)	48	8602	15	7853	-1.908	0.061*
Dried Tea(MMK/Kg)	117	5514	97	5284	-1.297	0.192
Pickle Tea Leaves(MMK/Kg)	20	1951	28	2258	1.572	0.125
Tea Income (MMK/Acre)	239	1764211	161	1532604	-1.906	0.057*

Notes: *p < 0.1, ** p < 0.05, *** p < 0.01

5.3.4 Institutional support

Table 5.4 highlights the significant difference in institutional support between members and non-members, emphasising the significant benefits that membership provides in terms of access to various support services. As shown in Table 5.4, there is a significant difference in access to technical support between members and non-members. All members (100%) receive agricultural technical support, whereas non-members do not receive any. According to the survey responses, members reported receiving various types of technical training, including pruning, nursery management, compost preparation, organic certification, and quality and safety training. Similarly, members benefit significantly from agricultural input support, with 100% of members receiving this benefit compared to none of the non-members. This support provides members with essential inputs such as seeds, organic fertiliser, and pruning tools.

Market support is another area where membership offers distinct advantages. All members (100%) receive market support, while non-members have no access to it. This assistance enables members to improve market access and secure higher prices for their products. According to some respondents, "The organisation helps us participate in trade fairs and connects us with buyers, which has made a big difference in how we sell our tea." This support also includes help with obtaining certifications and organising market linkages, allowing members to better position themselves in the market. Members predominantly access extension services, with 49.37% of members benefiting from these services compared to only 6.83% of non-members (p-value = 0.000). Extension services offer ongoing education and support, helping farmers stay informed about the latest agricultural practices and technologies.

Table 5.4 Institutional support

		Members		Non-Members			
Variable	**Category**	**Obs**	**Percent %**	**Obs**	**Percent %**	**Chi-square**	**P-value**
Agricultural technical support	Yes	157	100.00	0	0.00	174.093	0.000***
Agricultural input support	Yes	91	100.00	0	0.00	79.354	0.000***
Market Support	Yes	64	100.00	0	0.00	51.325	0.000***
Extension Services	Yes	118	49.37	11	6.83	79.674	0.000***

Note: *p < 0.1, ** p < 0.05, *** p < 0.01

5.4 Profitability estimation of tea production

Table 5.5: Profitability estimation of tea production per acre

Characteristics	Members	Non-Members	t-test	p-Value
Tea Income (MMK)	1,764,211	1,532,604	-1.906	0.057*
Variable Cost (MMK)	226,032	201,476	-1.248	0.212
Fixed Cost (MMK)	58,608	26,134	-4.309	0.000***
Total Tea Production Cost (MMK)	284,641	227,610	-2.726	0.007***
Net farm profit (MMK)	1,479,570	1,304,993	-1.470	0.142

Note: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

***$1NZD = 1233.61 MMK**

Table 5.5 presents the profitability estimation of tea production per acre, comparing members and non-members across various financial characteristics. T-test inferential statistical test is used to analyse the statistical significance of the differences observed between the two groups. Based on a simple comparison in Table 5.5, members of producer organisations have statistically significantly higher production costs than non-members. The difference of 57,031 MMK per acre is statistically significant, with a p-value of 0.0067. Variable costs, including seedlings, EM Bokashi, compost, gypsum, urea, T-super, compound, pesticides, herbicides, and labour for various activities (land preparation, planting, pruning, weeding, plucking, and grading), are also higher for members. On average, members spend 226,032 MMK per acre on variable costs, compared to 201,476 MMK per acre for non-members. Fixed costs, including machinery and pruning tools, are significantly higher for members, averaging 58,608 MMK per acre, compared to 26,134 MMK per acre for non-members. This substantial difference of 32,474 MMK is highly significant, with a p-value of 0.0001. During pre-work interviews, farmers mentioned, "*As members, we have to follow organic farming practices, which means investing in tools and machinery that non-members might not need. This increases our fixed costs significantly*." Members particularly invest in weeding machines because they cannot use herbicides to control weeds, thereby raising their fixed costs.

Despite the higher production costs, members of tea producer organisations achieve higher tea income per acre than non-members. On average, members earn 231,607 MMK more per acre than non-members. This tea income disparity is primarily due to members' ability to secure higher prices for their tea products and their higher yield per acre. During preliminary interviews, owners of organic tea processing factories indicated a willingness to pay a premium to member farmers.

Specifically, they stated, *"We provide 200-500 MMK more to the member farmers than to the non-member farmers."* This premium reflects the value placed on the quality and consistency of tea produced by members of the producer organisations.

Moreover, the higher income from tea leads to greater net farm profits for the members. On average, members earn 174,577 MMK more profit per acre than non-members. This suggests that despite higher costs for organic farming practices and hiring additional labour, the economic benefits of membership in producer organisations outweigh these expenses. Participating in producer organisation increases members' profitability, clearly demonstrating the financial advantages.

Although the data suggests that members of producer organisations generally achieve higher income and net farm profits compared to non-members, this simple comparison of the production costs and net farm profit between members and non-members does not control for potential selection bias. Factors such as self-selection into producer organisations based on farm characteristics or other factors may influence the observed differences in costs and profits. For instance, farmers who are more motivated or have better resources may join producer organisations more, which could introduce bias into the results. Therefore, further analysis using methods like propensity score matching is conducted in Chapter 6.

5.5 Summary

This chapter explores the Myanmar Tea Association's (MTA) role in supporting tea farmers, using data from pre-interviews and a descriptive survey. The Myanmar Tea Association (MTA), established in 2013, supports tea farmers by enhancing tea quality, ensuring food safety, and creating international market access opportunities. With over 20,000 members, it coordinates 18 tea clusters based on geographic distribution. The MTA provides input support, technical training, market linkages, and certification for organic products through collaborations with INGOs. Despite challenges, the MTA aims to develop tea demonstration farms, focus on organic and sustainable practices, produce Specialty teas, and introduce high-yield varieties to boost the competitiveness of Myanmar tea globally.

This study involved 400 smallholder tea growers from Pindaya, Pinlaung, and Ywan Ngan in Southern Shan State, Myanmar. The sample was divided into two groups: members and non-members of producer organisations. The respondents were characterised by their demographics, farm characteristics, market access, and institutional support. Out of 400 tea farmers, 239 were members, and 161 were non-members. Female farmers were more likely to be non-members

(62.11%), while male farmers showed a higher membership rate (47.70%). Age distribution was similar across both groups, with most respondents aged 35-55 years. Township distribution significantly influenced membership status, with Pindaya showing a balanced distribution, Pinlaung having more non-members, and Ywan Ngan having more members. Higher education levels were associated with membership. Members also engaged more in off-farm employment (51.88%) compared to non-members (48.45%), though non-members had higher off-farm incomes. Both groups had extensive tea farming experience, with non-members having one more year of experience. Family labour was common, with members involving more household members in tea farming activities.

Farm characteristics showed no significant difference in farm size or harvesting frequency between groups. However, members had higher production volumes, indicating more efficient practices, possibly due to technical training from producer organisations. A significant difference was observed in farming practices, with most members (84.52%) practising organic farming compared to non-members (8.70%). Members also significantly used more cover crops and machinery, supported by organisational inputs.

Marketing aspects revealed that members had significantly higher certification rates (81.17%) and better access to market information (55.23%). Although product prices were not significantly different, members generally received higher prices for certain tea products. Members also earned higher tea incomes and net farm profits per acre due to better prices and yields. Institutional support was significantly different, with members receiving technical training, agricultural inputs, and market support. All members benefited from these supports, unlike non-members. This institutional support significantly contributed to the higher profitability observed among members.

Members had higher production costs, both variable and fixed, due to organic farming practices and the need for specialised tools and machinery. Despite higher costs, members earned more per acre and had higher net farm profits than non-members. The higher income was attributed to better prices and yields, supported by membership benefits. However, further analysis, such as propensity score matching, is needed to control for potential selection bias and provide robust conclusions about the true impact of membership on profitability.

Chapter 6 : Data Analysis and Discussion

6.1 Introduction

This chapter provides a comprehensive understanding of the determinants and economic outcomes of producer organisation membership for smallholder tea farmers in the Southern Shan State of Myanmar. It presents the econometric analysis of factors influencing smallholder tea farmers' decisions to join producer organisations and the impact of membership on their profit per acre. The analysis begins by identifying the determinants of membership decisions. It uses a probit regression model to examine various socio-economic and farm-related variables for their significance in predicting the likelihood of joining. To control for selection bias, the propensity score matching (PSM) technique was used, estimating the average treatment effect on the treated (ATT) to assess how membership affects the profit of the smallholder tea farmers.

6.2 Factors influencing farmers' membership in producer organisations

The probability of smallholder tea farmers joining a producer organisation is estimated using a probit model. In this model, the dependent variable is binary: it assumes a value of 1 if the respondent is a member of a producer organisation and 0 if not. Ten predictor variables include age, gender, education level, tea farming experience, off-farm activity, tea farm size, yield per acre, certification, market information, and extension services.

Factors influencing households' decisions to join producer organisations are presented in Table 6.1, along with their marginal effects. In the probit regression model, the coefficients alone do not provide complete interpretive value; they indicate only the direction of the relationship between the dependent and predictor variables. Therefore, marginal effects illustrate the correlation of a unit change between predictor variables and the dependent variable (Greene, 2018). The likelihood ratio test indicates that the model estimates are significant at the 1% level ($\chi^2 = 352.83$, $p < 0.000$). This result demonstrates that the predictor variables had significant effects on tea farmers' decisions to join the producer organisation. The Pseudo R^2 value was 0.654, suggesting that the probit regression model used in the study was a good fit for the data set, explaining 65% of the variation in the dependent variable.

Table 6.1: Factors affecting farmers' decision to join producer organisations

Variable	Coefficient	Marginal effect (dy/dx)	Standard error	P-value
Age	0.087	0.027	0.054	0.616
Gender	0.312	0.098	0.068	0.148
Education	0.169	0.053	0.032	0.096*
Tea Farming experiences	-0.016	-0.005	0.002	0.077*
Off-farm activity	0.000	0.000	0.068	0.997
Tea Farm Size	-0.004	-0.001	0.014	0.918
Yield/acre	0.000	0.000	0.000	0.966
Certification	2.812	0.886	0.076	0.000***
Access to market information	0.763	0.240	0.070	0.001***
Extension services	1.364	0.430	0.080	0.000***
Constant	-1.83			

Note: *p < 0.1, ** p < 0.05, *** p < 0.01; N=400, Log Likelihood= -93.190697, LR chi2= 352.83, Pseudo R2= 0.654, Prob>chi2=0.000

The results from Table 6.1 show factors such as certification, access to market information, and extension services are highly significant at the 1% level, and Education and Tea Farming Experiences are significant at the 10% level. Certification status has a highly significant positive impact on farmers' decisions to join producer organisations (coefficient =2.812556, $p < 0.01$). The marginal effect indicates that certification increases the probability of joining by approximately 89%. This is because most tea farmers in southern Shan State are organic by default, as they do not apply any chemical fertilisers to their farms. Despite their natural farming practices, their products are not certified, making it difficult for them to achieve better prices or explore export opportunities. In addition, obtaining certification individually is expensive and complex. By joining the producer organisation, farmers can acquire a collective organic EU certificate at no cost. This certification not only validates their organic practices but also opens the door to high-value markets. In addition, the producer organisations guarantee a stable market for their products by purchasing their organic tea products at higher prices. As a result, certification plays a crucial role in farmers' decisions to join producer organisations.

This finding is consistent with several studies that have explored the impact of certification on organisational behaviour among agricultural producers (Holzapfel and Wollni,2014; Kuan et al.,2021; Pinto et al.,2014; Rueda and Lambin,2013). For instance, Holzapfel and Wollni (2014) demonstrated that certification resulted in significant benefits for farmers, maintaining their compliance even after the end of donor support. Kuan et al. (2021) observed a positive relationship between cooperative involvement and organic certification adoption. Rueda and Lambin (2013) found that Rainforest Alliance certification encouraged farmers to join producer organisations due to benefits like better market access. Similarly, Pinto et al. (2014) noted that group certification under the Rainforest Alliance system improved market access for small and medium-sized coffee producers in Brazil.

Secondly, access to market information also significantly increases the likelihood of joining a producer organisation (coefficient = 0.763653, $p < 0.01$). The marginal effect shows that access to market information increases the probability of joining by 24%. By joining the producer organisation, farmer members can participate in trade fairs organised by the producer organisation. Through these fairs, farmers can establish market linkages, gain access to price information for different products, and meet potential buyers. This enhanced access to market information helps farmers make informed decisions, increasing the likelihood of joining producer organisations. This finding aligns with various studies highlighting the importance of market information for producer organisations (Yogitha et al., 2023; Shiferaw et al., 2009; Aku et al., 2018; Fischer & Qaim, 2012). Yogitha et al. (2023) revealed that market support from FPOs attracts farmers by eliminating middlemen and securing better prices for their produce. Hill et al. (2021) demonstrated that market support, such as providing cash on delivery, increases the likelihood of smallholder farmers selling through the group.

Similarly, Aku et al. (2018) found that market access provided by farmer organisations significantly impacts farm income, with smallholder vegetable farmers earning higher incomes per season. Fischer & Qaim (2012) highlighted that producer organisations improve market access for smallholders by facilitating efficient information flows. Shiferaw et al. (2009) noted that Producer Marketing Groups (PMGs) in Kenya assist small producers by coordinating production and marketing, thereby enhancing marketable surplus and income.

In addition, the analysis indicates that the availability of extension services has a significant positive effect on farmers' decisions to join producer organisations. The regression results show a coefficient of 1.36452 ($p < 0.01$), suggesting a robust positive association. The marginal effect further reveals that extension services increase the probability of joining by approximately 43%. This is because joining a producer organisation enables farmers to access various training for their tea farming, including Bokashi compost training and farm management practices such as pruning and plucking. They can also gain access to agricultural inputs like seeds, farm equipment, and organic fertilisers. Empirical evidence suggests that farmers who receive extension services are more likely to join farmer groups (Tolno et al., 2015; Datta et al., 2018; Mishra & Vedasri, 2021; Gashaw et al., 2018; Gurung et al., 2023; Manda et al., 2020). According to Gurung et al. (2023), extension officials educate farmers on the importance and benefits of farmer groups and actively encourage their participation. With access to extension services, farmers become more informed about agricultural policies, which increases their propensity to join these groups (Datta et al., 2018; Manda et al., 2020; Tolno et al., 2015). In addition, the study by Tolno et al. (2015) revealed that access to extension services significantly increases group membership by 38.34%. This is likely because better-informed agricultural extension agents discuss and influence farmers' decisions about joining farmers' groups.

Education is significantly linked to the likelihood of joining a producer organisation at the 10% significance level, with a marginal effect of 0.0533. This indicates that each additional year of education increases the probability of joining by about 5.33 percentage points. Educated farmers may perceive greater benefits in joining producer organisations, such as improved resource access and enhanced collective bargaining power. This study is consistent with findings from various studies indicating that households with higher education levels are more likely to join producer organisations (Adong et al., 2012; Gurung et al., 2023; Zheng et al., 2012; Rokhani et al., 2021; Wang et al., 2019).For instance, the study by Zheng et al. (2012) revealed that higher educational degrees positively affect farmers' perception of joining cooperatives in Northern China, suggesting that more educated farmers may be more knowledgeable and open to new production and marketing methods.

Similarly, the study by Gurung et al. (2023) found that education has a positive and statistically significant marginal effect, with better-educated farmers being 1.9% more likely to join FPOs in India due to their greater awareness of the benefits of such organisations. However, contrary to the findings of Kayitesi (2019), Nugussie (2010), Yogitha et al. (2023) and Ekepu et al. (2017), education does not play a significant role in a farmer’s decision to join a producer organisation. Instead, farmers in these areas are motivated to participate due to their awareness of the benefits offered, such as resource access, practical knowledge, and economic incentives.

Contrary to the findings of Gurung et al. (2023) and Vu et al. (2020), the results show that the tea farming experience significantly negatively affects joining producer organisations at the 10% significance level, with a marginal impact of -0.0051. This indicates that each additional year of tea farming experience decreases the likelihood of joining by around 0.51 percentage points. One possible reason is that experienced farmers feel more self-sufficient and less dependent on producer organisations.

However, five other variables—age, gender, off-farm activity, tea farm size and yield per acre—did not significantly affect the decision to join producer organisations. The insignificant variables are categorised into two groups: no statistical significance with positive and negative signs. The results show that age, gender, off-farm engagement and yield per acre positively affect the probability of joining the producer organisation, but they were not statistically significant. On the one hand, tea farm size had negatively affected farmers' decision to join the producer organisation, with no statistical significance. Age and gender positively affect the membership but do not significantly affect the decision to join a producer organisation. A possible explanation is that the decision to join a producer organisation is driven more by economic and institutional factors rather than demographics. For example, individuals are motivated by potential economic benefits, policies and regulations that support participation, or institutional support and resources available within the organisation. The result aligns with the study of Yogitha et al. (2023), which shows that socio-economic factors, such as market access and resource availability, play a more significant role in the decision to join producer organisations than demographic factors such as age and gender. Another study by Gurung and Rai (2023) also supports the view that access to resources and services is more influential in the decision to join producer organisations than individual demographic characteristics. However, some studies contradict the idea that demographic factors, such as age and gender, significantly influence the decision to join producer organisations. For instance, Tolno et al. (2015) discovered that participation in farmer groups is closely linked to households' socioeconomic and demographic characteristics. Their research revealed that with each additional year of age, a farmer's probability of joining farmer groups increases by 0.59%, suggesting that older farmers are more inclined to participate. Additionally, women farmers are more likely to join the producer organisation than male potato farmers, with male-headed households being about 16.19% less likely to join groups. Moreover, a study by Adong et al. (2012) also reported that a more women farmer is expected to join the collective action.

Moreover, consistent with the findings of Gashaw and Kibret (2018), farm size did not significantly influence farmers' decisions to join the membership. This is because the membership is available to any tea grower in the study area without restrictions based on age or farm size. Additionally, the advantages offered by producer organisations, such as access to improved markets, training, and inputs, are equally accessible to all farmers, regardless of their farm size or experience level. However, according to Vu et al. (2020), farmers with larger tea farms are more likely to join the producer organisation than those with smaller ones.

6.3 Impacts of membership

6.3.1 Robustness and validity of matching estimates

To ensure high-quality matching, Ali and Adbulai (2010) recommend a balancing test of covariates. Therefore, before assessing the impact of membership on profit, the quality of matching is conducted to check for the fulfilment of common support conditions and to ensure that the balancing requirement of PSM is satisfied. Figure 6.1 shows the density distribution of estimated propensity scores for the two groups of farmers. Most of the members and non-members of producer organisations had a common support region; only 53 were outside the common support region and, therefore, dropped from the matched sample (see Table 6.2). The common support region refers to the range of propensity scores that overlap between the treatment and control groups, ensuring comparisons between similar units (Caliendo & Kopeinig, 2005; Dehejia & Wahba, 2002).

Table 6.2 Blocks of propensity scores

Propensity Scores' Blocks	Non-Member	Member	Total
0.0389451	73	6	79
0.2	20	10	30
0.4	6	5	11
0.6	4	11	15
0.8	5	207	212
Total	108	239	347

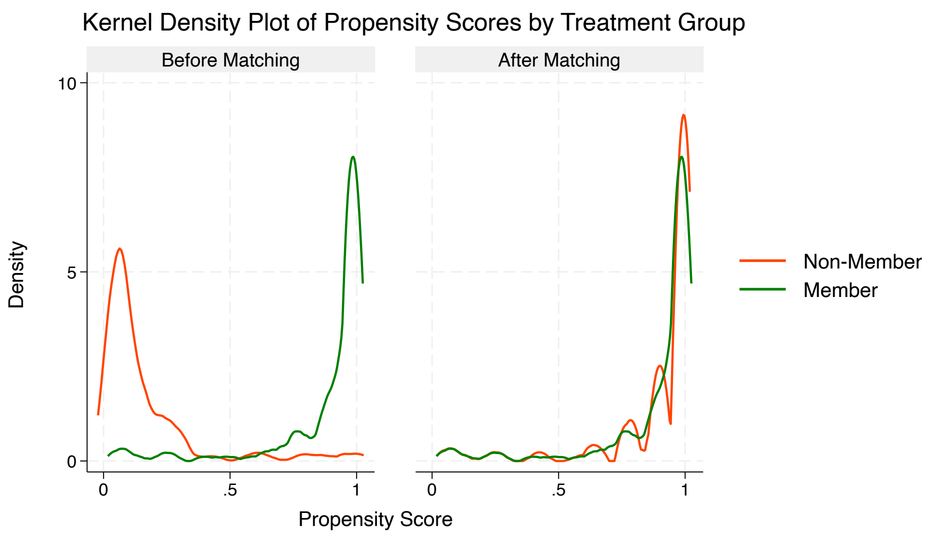


Figure6.1: Density distribution of propensity scores for members (treated group) and non-members (control group)

Figure 6.1 shows a significant lack of overlap between the propensity scores of the non-member and member groups before matching. This suggests that the groups are quite different regarding their covariate distributions, indicating a high potential for bias in estimating treatment effects. After matching, the increased overlap in the distributions suggests that the matching process has successfully balanced the covariates between the member and non-member groups, thereby enhancing the validity of the subsequent impact analysis on profit. The overlap in the distribution of the propensity scores across member and non-member groups was found to be satisfactory.

The balancing test was further performed to check the differences in covariates between the two groups from the matched sample. To ensure the quality of the matching, Standardised Mean Bias (MASB), pseudo R2 and log-likelihood ratio test were checked (see Table 6.3). The matching procedures have improved the balance of covariates between the treated and control groups, as evidenced by the reductions in pseudo R2, LR χ2 values, and MASB. Both matching methods, Nearest Neighbor and Radius Matching, have effectively balanced the sample, with Nearest Neighbour Matching (2) showing the lowest mean standardised bias at 14%. As shown in Table 6.3, the Pseudo R2 was 0.654 before matching, indicating a significant imbalance in covariates. After matching, the Pseudo R2 values were reduced significantly for all methods: 0.104 for Nearest Neighbor Matching (2) and 0.108 for Radius Matching (0.08), indicating a better balance between the covariates in the treated and control groups post-matching. Similarly, the LR x2 values decreased from 352.83 before matching to 48.18 for Nearest Neighbor Matching (2) and 50.10 for Radius Matching (0.08), indicating an improvement in balance. Despite the decrease in pseudo-R2 and LR χ2 values, the probability values remain at 0.0000. Finally, the reduction of the Mean Standardized Bias (MASB) from 28% before matching to 14% for Nearest Neighbor Matching (2) and 17% for Radius Matching (0.08) indicates successful matching. According to Rosenbaum and Rubin (1985), the mean absolute standardised bias (MASB) should be less than 20% to confirm the success of the matching process.

Table 6.3: Indicators satisfying balancing property before and after matching

Test	Before Matching	After Matching	
		Nearest Neighbor Matching (2)	Radius (0.08) Matching
Pseudo R2	0.653	0.104	0.108
LR x2	352.83	48.18	50.10
Prob>x2	0.000	0.000	0.000
Mean standardized bias	28	14	17

Notes: *, ** and *** are significance levels at 10 %, 5% and 1%, respectively; NNM (2) = 2 nearest neighbour matching with replacement and common support; Radius Matching (0.08) = radius matching with the bandwidth 0.08 and common support and Kernel-based matching.

6.3.2 Membership impact on profit per Acre for smallholder tea farmers

The average treatment effect on the treated (ATT) was used to estimate the impact of membership in producer organisations on profit per acre for tea farmers. The average treatment effect on the treated (ATT) measures the impact of a treatment (in this case, membership in producer organisations) on those who receive the treatment (Becker & Ichino, 2002). Two alternative matching techniques were checked to ensure the reliability of the propensity score matching estimates: Nearest Neighbor Matching (NNM) and Radius Matching (CM). Nearest Neighbor Matching (NNM) involves pairing each treated unit with the closest untreated unit based on the propensity score, ensuring a direct comparison between similar units (Austin, 2013). Radius Matching (CM), on the one hand, pairs each treated unit with all untreated units within a specified range of propensity scores, providing a balance between precision and robustness by including multiple nearby matches (Caliendo & Kopeinig, 2005). The results of the two matching models are presented in Table 6.4.

Table 6.4: Average treatment effects of membership on profit per acre for tea farmers.

Variable Sample		Mean Profit (Member)	Mean Profit (Non-Member)	Mean Difference	T. statistic
Before Matching		1,479,569	1,304,993	174,576	1.45
ATT (Average Treatment Effect on the Treated)	Nearest Neighbor Matching (2)	1,350,449	652,355	698,094	2.28**
	Radius Matching (0.08)	1,350,449	710,266	640,183	1.72*

Notes: *p < 0.1, ** p < 0.05, *** p < 0.01

Table 6.4 illustrates the Average Treatment Effect of membership on profit per acre for tea farmers, comparing the mean profits of members against non-members using two matching methods to evaluate the impact of membership. Before matching, members had an average profit per acre of 174,576 higher than non-members, although this difference was not statistically significant.

After matching, the profit of non-member farmers decreased drastically. This decline is attributed to the correction of selection bias, as the initially high mean profit for non-members could have been influenced by this bias. After matching, this bias is corrected, and the adjusted mean profit reflects a more accurate comparison. Propensity score matching (PSM) helps eliminate selection bias by balancing covariates between treated and untreated groups (Caliendo & Kopeinig, 2005).

Research has shown that PSM can significantly reduce measured selection bias, providing more reliable estimates of treatment effects (Heckman et al., 1996). Another possible reason is that the model excluded 18 non-member farmers while estimating the propensity scores. These excluded farmers are considered extreme outliers. The exclusion of extreme outliers helps create a more balanced comparison between the two groups, leading to a more reliable estimation of treatment effects (Bai, 2011). This approach ensures that the results are not skewed by extreme values, improving the validity of the findings (Leyrat et al., 2013).

In addition, the mean profit difference between members and non-members after matching increases and becomes statistically significant at the 5% level in Nearest Neighbour Matching and 10 % in Radius Matching. This suggests that membership has a significant positive effect on profit per acre for tea farmers. The significance at the 5% and 10% levels across the two matching techniques strengthens the robustness of this finding. After applying the two matching methods, the mean profit difference ranged from 640,183 to 698,094, indicating that the estimated effect of membership on profit per acre is positive and statistically significant. This range suggests that, after controlling for covariates, membership in the tea farmers' organisation increases profit per acre. The statistical significance at the 5% level provides a strong level of confidence in the result.

These findings align with various studies demonstrating that cooperative membership leads to high returns for farmer members (Vu et al., 2020; Gurung et al., 2023; Aku et al., 2018; Mojo et al., 2017; Tolno et al., 2015; Wang et al., 2019). For instance, Vu et al. (2020) report that membership in farmers' associations helps tea farmers in Vietnam improve access to market services, resulting in significantly higher average incomes compared to non-members. Similarly, Gurung et al. (2023) examine the economic impact of Farmer Producer Organisation (FPO) membership on organic farming households in Northeast India, revealing notable benefits such as higher annual net returns (Rs. 7,254–8,133), greater return on investment (4.6–4.8%), and increased profit margins (8–8.4%) for FPO members compared to non-members. Mojo et al. (2017) also found that coffee cooperative membership in rural Ethiopia is associated with higher household income and assets. Cooperative members achieve significantly better economic outcomes than non-members, who would benefit economically from joining cooperatives. Tolno et al. (2015) found that membership in farmer organisations increased income by 25% for smallholder potato farmers in Middle Guinea. Finally, Wang et al. (2019 determined that agricultural cooperative membership significantly increased farm profits in Taiwan, with food label certifications accounting for approximately 15% to 28% of this effect.

6.4 Summary

This chapter analyses the determinants and economic impact of producer organisation membership for smallholder tea farmers in the Southern Shan State of Myanmar. Econometric methods were used to explore factors influencing membership decisions and assess the impact of membership on profit per acre. A probit regression model is used to identify significant socio-economic and farm-related variables, while propensity score matching (PSM) is applied to control for selection bias and estimate the average treatment effect on the treated (ATT).

The probability of smallholder tea farmers joining a producer organisation is analysed using a probit model with ten predictor variables, identifying certification, access to market information, and extension services as significant factors. Certification increases the likelihood of joining by approximately 89%, allowing farmers to access high-value markets and better prices. Access to market information increases the probability by 24%, enabling informed decisions through market linkages and trade fairs. Extension services increase the probability by 43%, providing training and agricultural inputs. Education increases the likelihood by 5.33%, and farming experiences negatively affect the probability of joining the producer organisation. Other variables, such as age, gender, off-farm activity, tea farm size, and yield per acre, were not statistically significant in influencing membership decisions, with economic and institutional factors playing a more critical role.

The impact of membership on profit per acre is assessed using propensity score matching techniques, showing successful matching with significant reductions in pseudo R2, LR $\chi 2$ values, and mean standardised bias, confirming the effectiveness of Nearest Neighbour Matching (NNM) and Radius Matching (RM) in balancing the sample. Before matching, there was no significant difference in mean profit between members and non-members. After matching, membership significantly increased profit per acre, with Nearest Neighbour Matching showing a mean profit difference of 698,094 (statistically significant at 5%) and Radius Matching showing a difference of 640,183 (statistically significant at 10%). These results indicate that membership in producer organisations substantially enhances the profitability of smallholder tea farmers.

Key findings include the identification of certification, market information access, extension services, education level and farming experience as critical determinants of joining producer organisations, and the positive impact of membership on profit per acre. The use of propensity score matching effectively balances covariates and controls for selection bias, providing robust estimates of the treatment effects. This study contributes to understanding how producer organisation membership affects smallholder tea farmers in Myanmar, offering empirical evidence on the importance of certification, market information, extension services, and education in influencing membership decisions. Additionally, it demonstrates the positive economic impact of membership on farmers' profitability, offering insights into effective policy interventions to support smallholder farmers. Applying robust econometric techniques, such as propensity score matching, further enhances the validity of the findings, improving the quality of research in agricultural economics.

Chapter 7 : Conclusion and Recommendation

This chapter provides a detailed summary of the study's findings and outlines recommendations based on the research questions and objectives. The content is structured into five sections: (1) an overview of the research objectives and methodologies used, (2) a summary of the key findings, (3) the implications of the research along with recommendations, (4) the limitations encountered during the research, and (5) suggestions for future research.

7.1 An overview of research objectives and methodologies used

Despite Myanmar's ideal conditions for tea cultivation and being one of the world's largest tea producers and exporter countries, the country's smallholder tea farmers face significant challenges. These include limited access to value-addition techniques, market information, affordable credit, and adequate infrastructure. Numerous studies suggest that producer organisations can mitigate these challenges by providing technical training, facilitating market access, organising collective bargaining for better credit terms, improving infrastructure, and enhancing coordination among stakeholders for more efficient operations in the value chain. However, a research gap exists in understanding their impact on Myanmar's tea industry. Therefore, this study aims to fill that gap by exploring producer organisations' role and economic impact on smallholder tea farmers.

The objectives of this study were to analyse the role of producer organisations, focusing on the factors affecting farmers' decisions to join these organisations and the impact of membership on the profitability of smallholder tea farmers in Southern Shan State, Myanmar. A combination of pre-interview and survey approaches was employed to achieve these objectives. Initially, pre-interviews were conducted with key stakeholders to explore the role and background of tea producer organisations in the Myanmar tea industry. Following this, purposive sampling was used to select a total of 400 tea farmers from Southern Shan State, including 239 members of producer organisations and 161 non-members. Structured questionnaires were used to collect comprehensive data on farmers' demographics, farm characteristics, marketing practices, and institutional support.

The collected data were then analysed using various methods. Descriptive analysis was used to summarise the data. In contrast, inferential analysis was used to compare differences between members and non-members, including Chi-square tests for categorical variables and T-tests for continuous variables. In addition, econometric analysis using probit regression to identify factors influencing the decision to join producer organisations and Propensity Score Matching (PSM) to assess the impact of membership on profitability. This comprehensive approach provides a thorough understanding of producer organisations' role and economic impact on smallholder tea farmers in Myanmar.

7.2 Summary of the key findings

The key findings of this study are categorised into three sessions: pre-interview results, descriptive results, and analysis results. The pre-interview results found that the Myanmar Tea Association (MTA) and its tea cluster groups/ producer organisations play a crucial role in coordinating activities among its members. Since its establishment in 2013, the Myanmar Tea Association (MTA) has supported its members tea farmers by enhancing tea quality, ensuring food safety, and creating opportunities for international market access. With a membership of over 20,000, the MTA coordinates 18 tea clusters based on geographic locations. Through collaborations with international non-governmental organisations (INGOs), the MTA provides input support, technical training, market linkages, and certification for organic products. Despite facing several challenges, the MTA aims to develop tea demonstration farms further, focus on organic and sustainable practices, produce Specialty teas, and introduce high-yield varieties to enhance the global competitiveness of Myanmar tea.

The descriptive analysis reveals several key findings about the smallholder tea farmers in Southern Shan State, Myanmar. Membership in producer organisations is associated with several demographic and operational advantages. Male farmers and those with higher education levels are more likely to be members of producer organisations. Farm characteristics show that while the average farm size and harvesting frequency are similar between members and non-members, members tend to produce higher volumes of tea per acre. This suggests that members benefit from more efficient farming practices. Additionally, a significant proportion of members engage in organic farming and use advanced farming practices such as cover crops and machinery, likely due to the support provided by producer organisations. Members also benefit from higher certification rates, allowing them access to premium markets, and better market information, helping secure higher prices for certain tea products, resulting in higher income per acre. Institutional support is a critical differentiator, with members receiving comprehensive support that non-members largely lack. This includes technical training in advanced farming techniques, provision of agricultural inputs, and market support through better market linkages and trade fair participation. Overall, the descriptive findings highlight that membership in producer organisations provides substantial benefits, including improved farming practices, better market access, and increased institutional support, enhancing the profitability of smallholder tea farmers in Myanmar.

Using econometric methods, the study identifies the factors influencing membership decisions and assesses the impact of membership on profit per acre. The probit regression model reveals that certification, access to market information, extension services and education level positively correlate with joining a producer organisation. Certification increases the likelihood of membership by approximately 89%, access to market information by 24%, extension services by 43% and education by 5.33%. Farming experience has a significant negative effect on joining producer organisations. Other variables, such as age, gender, off-farm activity, tea farm size, and yield per acre, were not statistically significant. Propensity score matching (PSM) techniques, including Nearest Neighbour Matching (NNM) and Radius Matching (RM), were used to estimate the impact of membership on profitability. The analysis shows that after matching, membership significantly increases profit per acre. NNM results indicate a mean profit increase of 698,094 (statistically significant at 5%), while RM shows an increase of 640,183 (statistically significant at 10%).

7.3 Research implication and recommendations

Although previous literature often emphasises a general mistrust of cooperatives in Myanmar, largely due to the history of forced cooperatives under the socialist regime, the findings of the study suggest a more positive current reality. The association of cooperatives with government control during that period led to scepticism, with many viewings them as government-driven entities. However, the results of this study demonstrate that membership in producer organisations provides significant economic benefits to smallholder farmers, particularly in terms of increased profitability, access to markets, and technical support.

Therefore, encouraging wider participation in producer organisations is crucial for enhancing the economic outcomes of more farmers. Governments, NGOs, and agricultural bodies should actively promote membership benefits, making farmers more aware of the opportunities these organisations offer. Producer organisations need to put more effort into informing and persuading farmers, particularly those in remote or less accessible areas, about the advantages of joining. This can be achieved through outreach programs, demonstrations, and partnerships with local agricultural extension services. However, it is important to acknowledge that many producer organisations face challenges. They often struggle to thrive due to limited government support and a heavy reliance on NGOs for financial and technical assistance. To ensure the long-term sustainability of these organisations, the following recommendations are proposed:

Policymakers:

Strong government support is essential to maintain the growth of the tea sector. Currently, support from the government is minimal, and most support is from Non-Government Organisations

(INGOs). However, reliance on INGOs is not sustainable in the long term due to their limited engagement periods. Thus, policymakers should focus on:

- Expand the focus of the Myanmar Agricultural Development Bank to include specialised financing options for tea farming and processing. Provide financial incentives such as grants and low-interest loans to support the tea sector's growth.
- Focus on agricultural research to improve tea varieties and farming techniques. Provide extension services to spread this knowledge to farmers, ensuring they have access to the latest advancements in tea cultivation and processing.
- Support the Myanmar Tea Association (MTA) by providing extension services to assist in forming and developing producer organisations and cooperatives among tea farmers. Additionally, offer training and capacity-building programs through the MTA to ensure these organisations can effectively manage resources, negotiate with buyers, and continuously support their members.

Producer Organisations:

Producer organisations are vital for improving the economic outcomes of their members. To maximise their impact, these organisations should focus on:

- Currently, producer organisations are not entities buying tea products from smallholder tea farmers; rather, it is the members who own processing factories and export companies. Therefore, it is crucial for producer organisations to develop and implement policies that protect the interests of smallholder tea farmers in terms of buying and selling within the organisation. This includes ensuring fair prices, transparent transactions, and protecting farmers from exploitative practices. The Myanmar Tea Association, which includes tea farmers, processing companies, and export companies, must create a balanced and fair policy framework that supports all stakeholders in the value chain.
- Continue to provide regular training sessions on advanced farming techniques, value-addition processes, and sustainable practices. Strengthen connections with domestic and international markets to help members secure better prices and stable demand.
- Enhance the link for private sector partners to improve the technical capacity of farmers for quality domestic production. Support the development of digital platforms for providing technical advice.
- Since the formation of a full-time office group in 2021, the Myanmar Tea Association has operated more efficiently and built trust among its members. It is recommended that the association continues strengthening this office group by providing ongoing professional development and ensuring they have the necessary resources to manage and expand the organisation's activities effectively. This full-time commitment is crucial for maintaining operational efficiency and member trust.

International Non-Government Organisations (INGOs)

Currently, the Myanmar Tea Association relies heavily on the support of INGOs for operating its activities. While this support is invaluable, it is essential to ensure the sustainability and independence of the association in the long term. INGOs can help achieve this by:

- Assist the Myanmar Tea Association in developing its institutional capacity to operate independently. This can include training in organisational management, financial planning, and strategic development.
- Continue to offer expertise in sustainable farming, market access, and organisational management. Develop training modules and resources for producer organisations and provide financial support for infrastructure projects, training programs, and certification processes.
- Facilitate knowledge-sharing initiatives such as exchange visits, workshops, and conferences to introduce best practices and innovative solutions. Support advocacy efforts to shape policies that benefit smallholder farmers.
- Facilitate enhanced marketing channels for tea farmers and support market research to identify and boost international demand and trade for Myanmar tea.
- Help the Myanmar Tea Association develop and implement transition plans to gradually reduce reliance on INGO support by diversifying funding sources, establishing revenue-generating activities, and building stronger ties with local and international stakeholders.

Buyers

Tea buyers and processing companies who are members of the Myanmar Tea Association (MTA) play a crucial role in the tea value chain. They purchase tea products from smallholder tea farmer members, provide technical training, and supply the necessary equipment. To further enhance their impact, they should:

- Continue and expand the provision of technical training and equipment to smallholder tea farmers. Focus on advanced agricultural practices, post-harvest handling, and quality control to improve the quality of tea products.
- Work with the MTA to develop and implement fair trade policies that ensure transparent and equitable transactions between processing companies and smallholder tea farmers. This includes setting fair prices, providing timely payments, and avoiding exploitative practices.
- Collaborate with Myanmar Tea Association to explore new markets and enhance existing ones. Participate in trade fairs, exhibitions, and international buyer missions to promote Myanmar tea products and secure better market opportunities.

- Establish long-term contracts with smallholder tea farmers to ensure a stable supply of high-quality tea. This will provide farmers with financial security and encourage them to invest in improving their farming practices.

7.4 Limitations of the research

While this study provides valuable insights into the role and impact of producer organisations on smallholder tea farmers in Southern Shan State, Myanmar, several limitations should be acknowledged.

- The research is geographically limited to Southern Shan State. This study was originally intended to be conducted in both Southern and Northern Shan States, as Northern Shan State is a major tea production area, accounting for approximately 50% of Myanmar's tea production. However, due to ongoing conflicts in Northern Shan State, the research could only be carried out in Southern Shan State. Consequently, the findings may not be fully generalisable to other tea-growing regions in the country, particularly Northern Shan State, with different agricultural, economic, and social conditions.
- The study relies on a purposive sampling method involving 400 tea farmers. Although sufficient for this research, this sample may not represent Myanmar's broader population of tea farmers. While effective for this study’s objectives, the purposive sampling method may introduce selection bias as it might not capture the full diversity of smallholder tea farmers.
- Data was collected through structured questionnaires and pre-interviews, which depend on self-reporting by farmers. This method can introduce response bias, as participants might overstate positive or underreport negative outcomes due to social desirability or recall issues. Additionally, the cross-sectional nature of the data collection limits the ability to infer causality.
- The study does not account for all external factors that could influence the profitability of tea farmers, such as market fluctuations, changes in government policies, climate conditions, and global economic trends. These factors can significantly impact tea farming outcomes and producer organisations' effectiveness.
- While using probit regression and propensity score matching (PSM) techniques helps control for selection bias and estimate the treatment effect, these models have inherent limitations. The accuracy of these models depends on the correct specification of the model and the quality of the data used. Unobserved variables may influence both the decision to join producer organisations, and the outcomes measured, which were not accounted for in the analysis. These unobserved factors could potentially bias the results.

7.5 Future research

Building on the findings and limitations of this study, several possibilities for future research are recommended to deepen the understanding of the role and impact of producer organisations on smallholder tea farmers in Myanmar.

- Future studies should consider expanding the geographic scope to include other tea-growing regions in Myanmar. This would allow for a more comprehensive understanding of how producer organisations operate in different contexts and whether the findings from Southern Shan State can be generalised to other areas.
- Research involving larger and more diverse samples of tea farmers across various regions would enhance the generalisability of the findings. Random sampling methods could capture a broader range of experiences and characteristics among smallholder tea farmers.
- Comparative studies between different types of producer organisations and comparisons with other agricultural sectors could offer valuable insights into best practices and the relative effectiveness of different organisational models. This could help identify the most successful strategies for supporting smallholder farmers.

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Appendices

Appendix 1: Survey questionnaires

Survey Questionnaires

Module 0: Pre-interview Information, Introduction and Consent Module

Enumerator Name	(Name)
Respondent ID	(ID)
Date of Interview	
GPS- Location	
1. Introduction	
2. Do you agree to participate in this interview?	1= Yes 2= No

Module A: Respondent's and Household Information

A_01	What is your name?	Name
A_02	What is your phone number	Number
A_03	Are you male or female? (Can fill out based name/person without asking)	1= male 2= female
A_04	How old are you? (Fill the full age only)	(in years)
A_05	Which township are you from? (Single select)	1= Pindaya 2= YwaNga 3= Pinlaung
A_06	Can you tell your village name?	(text)
A_07	What is the level of education? (Single-select)	1= No Formal Education 2= Primary School 3= Secondary School 4= High School 5= Bachelor's degree 6= Master's Degree 7= Doctoral Degree/Ph.D 8= Others, please specify
A_08	Years of farming experience	years
A_09	Years of tea farming experience	years
A_10	Number of household members	Number
A_11	How many household members are involved in tea fa	Number
A_12	Do you engage in any off-farm activities?	1= Yes 2= No >>>skip to Module B
A_13	If yes, what kinds of off-farm activities are you involved in? (multiselect)	1= Working at a private compa 2= Working for government 3= Running an own business 4= Working as a farm lab someone else's farm 5= Working as a non-farm

		6= Others, please specify
A_14	Total annual income from off-farm activities?	Kyats/Year

Module B: Farm Characteristics

B_01	What types of other agricultural activities are you involved in? (multi select)	1= Maize farming 2= Livestock farming 3= Fruit and Vegetable farming 4= Rice Farming 5= Others, please specif
B_02	What is your total acreage of farm size?	acres
B_03	What is the total acreage of your tea farm?	acres
B_04	How many plots of tea farms do you have?	Number
B_05	What is the type of your tea farm?	1= Organic >> B_06_or 2=Conventional>> B_06_conventional 3= Both
B_06_organic	What is the total acreage of your organic tea farm?	Acres
B_06a_ organic	How many organic tea plots do you have?	Number
B_06_conventional	What is the total acreage of your conventional tea farm?	Acres
B_06a_conventional	How many conventional tea plots do you have?	Number
	Largest Organic Plot	
B_06b_ organic	What is the acreage of your largest organic plot?	Acres
B_06c_organic	How many tea plants are on the largest organic plot?	Number
B_07_organic	When did you start growing tea on that largest organic plot?	Year
B_08_organic	What type of tea variety do you grow on that plot? (multi select)	1= Camellia assamica/ Assam tea (India) 2= Camellia sinensis (Chinese) 3=Irrawaddiensis tea (Local) 4=Others, please specify
B_09_organic	Do you own the land?	1=Yes >>> B_09b_organic 2= No >>>B_09a_organic
B_9a_organic	If no, what is the annual rental cost per acre?	MMK
B_09b_organic	Do you have any land ownership certificates?	1=Yes >>> B_10_organic 2= No >>> B_10_organic
B_10_organic	In what year did you start producing organic tea?	year
B_11_organic	What motivated you to transition to organic farming? (multi select)	1= Higher price 2= Reduce input cost 3= Environmental benef 4= Secure market 5= Health benefits

		6= Others, please specify
B_12_organic	Do you face any challenges during the transition to organic farming?	1=Yes>>> B_12a_organic 2= No
B_12a_organic	What are the challenges you faced during the transition of organic farming? (multi-select)	1= High initial investr organic inputs 2= Limited knowled organic farming Practices 3= Documents/ Record 4= Marketing organic te 5= Others, please specif
	Largest Conventional Plot	
B_06b_ conventional	What is the acreage of your largest conventional plot?	Acres
B_06c_ conventional	How many tea plants are on the largest conventional plot?	Number
B_07_ conventional	What did you start growing tea on that largest conv plot?	Year
B_08_ conventional	What type of tea variety did you grow on that plot (multi-select)	1= Camellia assamica/ Assam tea (India) 2= Camellia sinensis (Chinese) 3=Irrawaddiensis tea) (Local) 4=Others, please specify
B_09_ conventional	Do you own the land?	1=Yes (go to question, 7) 2= No (go to question,6)
B_9a_ conventional	If no, what is the annual rental cost per acre?	MMK
B_09b_ conventional	Do you have any land ownership certificates?	1=Yes >>> B_10_ conventional 2= No >>> B_10_ conventional
B_11_ conventional	Do you have plan to change your tea farm into Organic tea in the future?	1=Yes>>>Module C 2= No>>> B_12_ conventional
B_12_ conventional	What are the reasons that make you not to practice organic farming? (multi-select)	1= Higher input cost 2= Lack of labor 3= Low yield 4= Low demand insufficient market supp 5= No noticeable diffe price for organic tea 6= Others, please specif

Module C: Irrigation and Soil Conservation Practices

	Irrigation Practices	
C_01	Did you apply any irrigation system to your tea farm	1=Yes>>C_02

	in the last year?	2= No , rainfed
C_02	If yes, what type of irrigation did you apply? (multi-select)	1= Rain-fed 2= Manual 3= Drip irrigation 4= Sprinkler irrigation 5= Others, please specify
	Soil Conservation Practices	
C_03	Do you used cover crops to protect and enhar fertility?	1=Yes>>C_04 2= No>>>Module D
C_04	If yes, what types of cover crops did you grow?	1= Legumes (e.g. Rice Bean) 2= Grasses 3= Other, please specify
C_05	Where did you purchase those cover crops?	1= Other Farmers 2= Producer Organization 3= Broker 4= Dealerships or suppliers 5= For others, please specify
C_06	How much did you pay per unit?	(pyi)

Module D: Tools and Machinery Used

	Tools Used	
D_01	Do you perform pruning on your tea farm?	1=Yes (go to the question, 2) 2= No
D_02	If yes, how often do you perform pruning on your organic tea farm? (single select)	1= Every year 2= Once every two years 3=Once every three years 4= Once every four years 5= Others, please specify
D_02a	What types of tools did you use for pruning on your tea farm? (multi-select)	1= Scissors 2= Hedge shear 3= Knife 4= Electric Pruners 5= Other (please specify)
D_03	Do you own the Pruning Tools?	1= Yes>>> **D_03_1** 2= No>>>D_04
D_03_1	If yes. How many quantities do you have?	Number
D_03_2	Price /Unit	Kyat/Unit
D_03_3	Which latest year did you buy them?	Year
D_03_4	How long can it be used?	Year
D_04	If no, where do you rent them? (multi-select)	1= Other Farmers 2= Producer Organization 3= Broker 4= Dealerships or suppliers 5= For others, please specify
D_04_1	How much do you pay for renting the Tools?	Per Hour Per day Per acre
	Machinery Used	
D_05	Did you apply any mechanization techniques tea	1=Yes>>>D_06 2= No

	farm in the last year?	
D_06	If yes, what types of machinery do you use? select)	1= Weeding Machine 2= Tea pruning machine 3= Tea Leaf plucking machine 4= Others, specify
D_06_1	Do you own the machinery equipment?	1=Yes>>> D_06_2 2= No>>>D_07
D_06_2	If yes. How many quantities do you have?	Number
D_06_3	Price /Unit	Kyat/Unit
D_06_4	Which year did you buy them?	Year
D_06_5	How long can it be used?	Year
D_07	If no, where do you rent them? (multi-select)	1= Other Farmers 2= Producer Organization 3= Broker 4= Dealerships or suppliers 5= For others, please specify
D_07_1	How much do you pay for renting the machin Equipment?	Per Hour Per day Per acre
D_08	Did you apply any mechanization techniques tea farm five years ago (2019) ?	1=Yes 2= No
D_09	At that time did you own or rent your machin	1= own 2= rent

Module E: Input Used

	E_01	E_02	E_03	E_04	E_05
Input	Did you use any inputs for yo production in the last year?	How many (unit) did you use in the last year?	Did you use your own seedlings?	Where did you purchase those inputs? (multi-select)	Price for each unit
	1=Yes>>E_02 2=No>>next input	Units 1. kg 2. 50 kg bag (=30 viss) 3. 25 kg bag 4. ton 5. pyi 6. viss 7. Bottle 8.liter 9999.Other (specify)	1=Yes 2= No>> E_04	1. Farmers 2. Producer organization 3. Broker 4.Local input supplier 5.Processing Factories 6.Others, please specify	Kyats/E_02_Unit
1. Seedlings					
2. EM Bokashi					
3. EM					
4.Manure/Compost					
5. Lime/ Gypsum					

6. Urea					
7. T-Super					
8. Compound					
9. Insecticides and Pesticides					
10. Herbicides (weed killer)					
11. Others, please specify					

Module F: Labor Used

Family Labor Used		
F_01	Did you use family labor for tea produ the last year?	1=Yes>> F_02 2=No
F_02	If yes, how many family members wo the farm in the Last year?	Number

Hired Labor Used						
Activities	**F_03**	**F_04**	**F_05**	**F_06**	**F_07**	**F_08**
	Did you hire labor for tea production in the last year?	Did you face any challenges in hiring the labor last year?	If yes, what kind of challenges did you face in hiring the labor last year?	No.of hired labor per time	No. of Days hired	Wage per day
	1=yes **2=no** **>>>Next activities**	**1=yes** **2=no >** **activities**	1= Non availability of labor in peak plucking season 2= High wage rate 3= Limited availability of skilled labor 4= Labor Shortages 5=Transportation issue for labor due to the remote locations 9999= Others, please specify	**#**	**#Days**	**MMKs**
1. Land Prepara						
2. Planting						
3. Pruning						
4.Weeding						
5. Plucking						
6. Transportatic						

7.Grading						
8. Drying						
9. Other, specify						

Module G- Harvesting

G_01	Did you face any challenges in tea harvesting last year?	1= Yes>>> G_02 2= No
G_02	If yes, what kind of challenges did you face in tea harvesting last year? (multi-select)	1= Lack of labor availability 2= Low productivity of the l 3= High incidence of pest an diseases 4= Heavy Rainfall 5= Drought 6=Inability to access fields 7= Other, please specify
G_02a	Did you face any of these challenges five years ago?	1= Lack of labor availability 2= Low productivity of the l 3= High incidence of pest an diseases 4= Heavy Rainfall 5= Drought 6=Inability to access fields 7= Other, please specify 8 = None
G_03	How many times did you harvest tea last year?	#
G_04	Which month did you start harvesting tea last year?	Months
G_05	Which month did you conclude harvesting last year?	Months
G_05a	Compared to five years ago, this year did you harvest tea for more months, fewer months or the same number of months?	1= More 2= Fewer 3= The same

Seasons	**G_06**	**G_07**	**G_08**
	Please indicate the seasons you harvest tea in last Year	How many times did you harvest tea in ${G_06} Season Last year?	On average, how much tea did you yield per harvest in ${G_06} Season last year?
1. Shwe Phi Oo Lut/ Shwe Phi Lar			
2.Shwe Phi Moe			
3. Kar Kant Oo			
4. Kar Kant Lar			
5. Hnin Tat			
6. Other, please specify			

G_09	Compared to five years ago, would you say your yield is higher this year, lower, or the same?	1= Higher 2= Lower 3= the same

Module H: Tea Marketing

H_01	Do you sell the following tea products? 1. Fresh Tea Leaves 2. Green Tea 3. Dried Tea 4. Black Tea 5. Pickle Tea Leaves 6. Others, Specify	1=yes 2=no>>next products
H_02	To whom did you sell your tea last year? (multi-select)	1=Local Consumers 2=Broker/Village Collector 3= Wholesaler 4= Retailers 5=Farmer Producer Organization 6= Tea Processing Factories 7= Supermarket/Mini Market 8= Other, Please Specify
H_03	Who is your largest buyers?	Select from H_02
H_04	Volume sold to the ${H_03}?	Viss/year
H_05	Average Selling price?	MMKs/Viss
H_06	What is the level of satisfaction with the prices you received for your Products?	1=satisfied 2= very satisfied 3= unsatisfied 4=very unsatisfied
H_07	Why did you choose this buyer? (multi select)	1=No other option is available 2= Provided credit (input or cash) in exchange for agreed sale 3= Makes advance payment 4= Makes immediate payment 5= Pays a good price 7= Convenient location (or collects from me) 8= To maintain a good, trusting relationship 9= Contract farming agreement 10=Buys in bulk 11= Buys limited amount 12= Other (please specify)
H_08	Describe your bargaining position? (multi select)	1= Accept price offered 2= Sometimes bargain 3= Set the price and do not bargain 9999= Others (please specify…..)

H_09	When are you paid for tea sold? (multi-select)	1= Before harvest 2= At delivered 3= 1-7 days later 4= More than one-week later 5= Others (please specify….)
H_10	Where did the sale take place? (multi-select)	1= On-farm 2= At home 3= Collection place 4= Producer Organization 5= Village market 6= Wholesaler market 7= Processing Factories 9= Others (please specify….)
H_11	If the sale was not on the farm and at home, did you use your own transportation to deliver it to buyer?If H_09!=1 | 2 only	1= On foot 2= Bicycle 3= Motorbike 4= Car 5= Bus 6= Truck 7= Others
H_12	What is the distance from your home to the buyer?	miles
H_13	How much did you pay for the transportation cost?	MMK
H_14	Did you know the price in market when you sell it?	**1=yes** **2=no**
H_15	If yes, how did you know? (multi-select)	1=Other farmers 2= Brokers 3= Producer Organization 4=Processing factories 5=Media 9999= Others, please specify
H_16	What major factors do you think determine the prices you receive? (multi-select)	1= Seasonality or availability of produce 2= Lack of marketing information 3= Quality 4= Bargaining/ negotiation power of buyers 5=Lack of transport 9997=Do not know 9999= Other (please specify…)

Module I: Certification

I_01	Do you need a certificate to sell your products?	1= Yes 2= No >><Next modules
I_02	If yes, what types of certificates do you hold?	1= Local/ Myanmar GAP 2= Global GAP 3= USDA Certificate 4= EU Certificate 5= Fair for Life Certificate
I_03	Is it easy to get this certificate?	1= Yes >>>I_05 2= No

I_04	If no, what specific aspects pose the greatest challenges? (multi-select)	1= Stringent standard required 2= Transition Period 3= Cost of Certification 4= Inspection Cost 5= Documentation and record-keeping 9999= Other (please specific……)
I_05	How long did it take to get this certificate?	**Years**
I_06	Who helped you to get the certificate? (Single-select)	1= I handle the certification process independently. 2= External organic certification agency 3= Agricultural extension services 4= Cooperative or farmer's association 9999= Other (please specify)
I_07	Did you pay the certification cost by yourself?	1= Yes >>>I_09 2= No
I_08	If yes, how much do you have to pay the annual cost?	**MMKs**
I_09	If No, who paid it for you? (single select)	1= Farmer Producer Organization 2= Department of Agriculture 3= External organic certification agency 4= Processing Factories 9999= Others (please specify…..)

Module J: Institutional Characteristics

J_01	Are you a member of any producer organization?	1= Yes >>>J_03 2= No
J_02	If no, please specify why you have not joined a producer organization? >>>>Next module	1 1= Lack of awareness 2= Membership fees 3= Lack of perceived benefits 4= Time constraints 5= Others, please specify
J_03	If yes, what is the name of the organization? (multi-select)	1= Pindaya Tea Cluster 2= Ywa Nga Tea cluster 3= Pinlaung Tea Cluster 4= Myanmar Tea Association 5= Others, please specify
J_04	How long have you been involved in this producer organization?	
J_05	Did you pay any fee for membership in the organization?	1= Yes 2= No
J_06	If yes, how much did you pay for the membership fee?	

J_07	In what area does the organization that you have participated in operate? (multi-select)	1= Production 2= Marketing 3= Both Production and Marketing 4= Others, please specify
J_08	Have you received any kind of support from your producer Organization?	1= Yes 2= No >>>Next Module
J_09	Did you receive any agricultural input support from the producer organization last year?	1= Yes 2= No >>> J_11
J_10	If yes, what kind of agricultural input support did you receive? (multi-select)	1= Seedlings 2= Fertilizer 3= Pesticides 4= Pruning Tools 5= Plucking Tools 6= Others, please specify
J_11	Did you receive any credit from the producer organization?	1= Yes 2= No >>>J_15
J_12	If yes, how much did you receive credit from the producer Organization last year?	
J_13	Did you have to pay any interest?	1= Yes 2= No
J_14	If yes, how much was the interest rate?	%
J_15	Did you receive any market support from the producer organization Last year?	1= Yes 2= No >>>J_17
J_16	If yes, what kind of market support did you receive from the producer organization last year?	1= Price information 2= Buyer's information 3= Market linkage 4= Certification 9999= Other (please specify)
J_17	Did you receive any extension services from the producer? organization last year?	1= Yes 2= No >>>J_19
J_18	If yes, what kind of extension services did you receive from the producer organization last year?	1= Production technology 2= Quality and safety 3= Product marketing 9999= Other, please specify
J_19	Please indicate the services and products provided by the producer organization that you are satisfied with. (multi-select)	1= Seedling 2= Fertilizer 3= Pesticides 4= Pruning Tools 5= Loan 6= Nursery Management Training 7= Compost Training 8= Organic Certification Training 9= Pruning Training 10= Quality and Safety Training 11= Market Information 12= Trade Fair 9999= Others, please specify

Module K: Agricultural Extension Services

K_01	Did youreceive any agricultural extension related to tea production Last year?	1= Yes 2= No>>> K_05
K_02	If yes, how many extension programs did you attend in the last year?	
K_03	Who is the extension service provider? (multi-select)	1= Government 2= NGOs 3= Producer Organization 9999= Other, please specify
K_04	What kind of agricultural extension services did you receive last year? (multi-select)	1= Production 2= Marketing 3= Organic Certification 9999= Other (please specify…..)
K_05	How many extension programs did you participate in five-years ago in 2019?	Number
K_06	Did you receive any credit last year?	1= Yes 2= No>>>K_05a
K_07	What was the form of the credit? (multi-select)	1= Cash 2= Planting materials 3= Agrochemicals 4= Others, please specify
K_08	Where did you get the credit from? (multi-select)	1= Bank 2= Microfinance 3= Traders 4= NGOs 5= Producer Organization 6= Input Trader 7= Family/friends 8= Processing Factories 9999= Other (please specify)
K_09	Did you receive any credit five years ago in 2019?	1= Yes 2= No>>>K_13
K_10	What was the form of the credit? (multi-select)	1= Cash 2= Planting materials 3= Agrochemicals 4= Others, please specify
K_11	Where did you get the credit from? (multi-select)	1= Bank 2= Microfinance 3= Traders 4= NGOs 5= Producer Organization 6= Input dealer 7= Family/friends 8= Processing Factories 9999= Other (please specify)
K_12	In what area did you spend the credit that you received? (multi-select)	1= Input 2= Marketing 3= Education 4= Health

		9999= Other (please specify….)
K_13	Did you access to market information last year?	1= Yes 2= No>>> Next modules
K_14	If yes, what type of information have you accessed last year?	1= Price 2= New marketplaces 3= Marketing method 4= Financial assistance 5= Organic Certification 9999= Other (please specify….)
K_15	Please indicate sources of market information. (Multi-select)	1= Newspaper 2= Radio 3= Television 4= Internet 5= Extension agent 6= Producer Organization 9999= Other (please specify….)

Appendix 2: Ethic approval letter

24/11/2023

Dear: Diana Naw

Re: Low Risk Notification - 4000028266 - The Role of Producer Organization in Upgrading the Value Chain: Linking Smallholder Tea Farmers to High Value Market in Myanmar

Thank you for submitting a low risk notification for your research/teaching/evaluation.

This email is to acknowledge receipt of the low risk notification and to inform you that the details of your project have been recorded in our database for inclusion in the annual reports to the Health Research Council Ethics Committee (HRCEC) and the Massey University Research Committee (URC).

You may proceed with your research, though it is advisable to provide a couple of weeks before commencing, as all low risk notifications are checked for completeness and clarity by a Research Ethics Advisor. You may be contacted if your application is incomplete and/or further clarification is required.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis.

If a sponsoring organisation, funding authority (e.g., the Health Research Council) or a journal require evidence of ethical approval from a Human Ethics Committee (with an approval number), you need to complete a full Massey University Human Ethics application to be reviewed and approved by one of our Human Ethics Committees. Applications must be submitted and approved prior to the commencement of the research.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact the Research Ethics Office, email humanethics@massey.ac.nz. "

Please include the following statement on all public documents (e.g., information sheet, consent form) related to your project:

> ***This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.***
>
> ***If you have any concerns about the ethical conduct of this research that you want to raise with someone other than the researcher(s), please contact Massey University Human Ethics by email: humanethics@massey.ac.nz.***

I wish you all the best in your research, teaching or evaluation activities and appreciate your thoughtful consideration of ethics principles and practices.

Ngā mihi nui,

Tracy Riley

Professor Tracy Riley
Acting Chair, Research Ethics Chair's Committee

Research Ethics Office, Research and Enterprise
Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand T 06 951 6841; 06 951 6840
E humanethics@massey.ac.nz; animalethics@massey.ac.nz; gtc@massey.ac.nz

Appendix 3: Research information sheet

Research Information Sheet

Dear Sir/Madam

I am Naw Diana, a Master of Agribusiness student at Massey University in Palmerston North, New Zealand. As part of my academic study, I am conducting research for my master's thesis titled "Role of Producer Organization in Upgrading the Value Chain: Linking Smallholder Tea Farmers to High-Value Market in Myanmar." This research aims to examine the crucial role of producer organizations in upgrading the tea value chain and to explore the factors influencing the participation of smallholder tea farmers in high-value markets. The insights gained from this study will contribute to a deeper understanding of the functions of tea producer associations and provide practical recommendations for improving collective action.

I am reaching out to invite you to participate in this research by sharing your experiences through an interview. The interview process will involve discussions with tea farmers in Pindaya Township, Ywa Nga Township and Pinlaung Township, EC members of the Myanmar Tea Association, Pindaya Tea Cluster, Ywa Ngan Tea Cluster, and Pinlaung Tea Cluster as well as specialized tea processing factories in each region. Your valuable input is crucial for the success of this research and for achieving its objectives.

Please be assured that all necessary measures will be taken to maintain the confidentiality and security of your data. Our data management and confidentiality procedures have been approved by Massey University's Human Ethics Committee. If you choose to participate, you will be asked to sign a consent form, and you have the option to decide whether your name and position will be acknowledged in the study. The interview is expected to take approximately one hour, and with your permission, I would like to record the session.

Participant's Rights:

- You have the right to decline to answer any specific question.
- You can ask questions about the study at any time during the interview.
- You may request the recorder to be turned off at any point during the session.
- Upon completion, you will be given access to a summary of the research results.

Data Management:

The data gathered will be utilized for my master's thesis, academic publications, and research organization publications. All data will be securely stored, and confidentiality will be ensured through the use of pseudonyms when required. Access to the thesis will be available through the Massey University Library.

Project Contacts:

For your convenience, below are the contact details for myself and my supervisors:

If you have any questions or require further information, please feel free to reach out. Your participation is highly valued, and I look forward to the possibility of working together in this research project.

Thank you and best regards,

Researcher
Naw Diana
Rotary E2.3 Universtiy Ave & Rehab Rd
Massey University,
Palmerston North
New Zealand

nawdiana.naw.1@uni.massey.ac.nz
[redacted]

Chief Supervisor
Prof. Nicola M. Shadbolt
Professor, Agribusiness Department,
Institute of Agriculture and Environment

Massey Univerisy
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N.M.Shadbolt@massey.ac.nz

Co-Supervisor
Dr. Ramilan Thiagarajah
Senior lecturer-Agribusiness
School of Agriculture and Envir

Massey Univerisy
Palmerston North
New Zealand
t.ramilan@massey.ac.nz

Appendix 4: Research consent form

MASSEY UNIVERSITY
COLLEGE OF SCIENCES
TE WĀHANGA PŪTAIAO

Participant Consent Form- Individual

I have read the research information sheet and had the study details explained to me. Any questions I had have been answered to my satisfaction, and I understand that I may ask further questions at any time. I have been given sufficient time to consider whether to participate in this study and I understand participation is voluntary.

I agree to participate in this study under the conditions and participant rights in the Information Sheet.
I agree/ do not agree to the interview being sound recorded.

Full name :……………………………………………………………………………………………………

Signature :……………………………………………………………………………………………………

Date :……………………………………………………………………………………………………

Te Kunenga ki Pūrehuroa

School of Agriculture and Environment (PN 433)
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